AMERICAN JOURNAL OF PHARMACEUTICAL EDUCATION

SUMMER

THE OFFICIAL PUBLICATION OF
THE AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY

NINETEEN HUNDRED SIXTY

AMERICAN JOURNAL of PHARMACEUTICAL EDUCATION

VOLUME 24 SUMMER, 1960 NUMBER 3

MELVIN R. GIBSON
EDITOR

CHARLES W. BLIVEN
BUSINESS MANAGER

PUBLICATION COMMITTEE

HAROLD G. HEWITT, CHAIRMAN, EXECUTIVE COMMITTEE, AACP
UNIVERSITY OF CONNECTICUT

CHARLES W. BLIVEN, SECRETARY-TREASURER, AACP
GEORGE WASHINGTON UNIVERSITY

MELVIN R. GIBSON, EDITOR
WASHINGTON STATE UNIVERSITY

Published quarterly by the American Association of Colleges of Pharmacy, partially supported by the American Foundation for Pharmaceutical Education, and printed by the Washington State University Press at the Washington State University, Pullman, Washington. Subscription price $5.00. Single copies $1.25. Second class postage paid at Pullman, Washington. Postmaster: Undelivered copies should be returned to American Journal of Pharmaceutical Education, School of Pharmacy, Washington State University, Pullman, Washington.

Editorial office: School of Pharmacy, Washington State University, Pullman, Washington. Address all communications concerning manuscripts to the Editor. Instructions to authors will be found in the announcement section of each Winter issue. Business office: School of Pharmacy, George Washington University, 2128 H Street N.W., Washington 6, D.C. Address all subscriptions and other business communications to the Business Manager. All new subscriptions begin with the Winter issue. The journal assumes no responsibility for statements made by authors. © American Association of Colleges of Pharmacy, 1960.

AMERICAN ASSOCIATION OF COLLEGES OF PHARMACY -- 1960-1961

OFFICERS

HENRY M. BURLAGE, PRESIDENT	UNIVERSITY OF TEXAS
LLOYD M. PARKS, VICE PRESIDENT	OHIO STATE UNIVERSITY
CHARLES W. BLIVEN, SECRETARY-TREASURER	GEORGE WASHINGTON UNIVERSITY
HAROLD G. HEWITT, CHAIRMAN, EXECUTIVE COMMITTEE	UNIVERSITY OF CONNECTICUT

EXECUTIVE COMMITTEE*

HAROLD G. HEWITT, CHAIRMAN	UNIVERSITY OF CONNECTICUT
GEORGE P. HAGER, 1961	UNIVERSITY OF MINNESOTA
KENNETH L. WATERS, 1961	UNIVERSITY OF GEORGIA
JOHN G. ADAMS, 1962	DUQUESNE UNIVERSITY
MELVIN R. GIBSON, 1962	WASHINGTON STATE UNIVERSITY
CHARLES W. BLIVEN, PAST PRESIDENT AND SECRETARY-TREASURER	GEORGE WASHINGTON UNIVERSITY
HENRY M. BURLAGE, PRESIDENT	UNIVERSITY OF TEXAS
LLOYD M. PARKS, VICE PRESIDENT	OHIO STATE UNIVERSITY

HONORARY MEMBER

ZADA M. COOPER	VILLISCA, IOWA

---

* Specification of a year after the name of a member of the Executive Committee indicates the year in which the term of office terminates at the time of the annual meeting.

CONTENTS

FEATURE SECTION

Teaching Professional Orientation, *Richard A. Deno* 265
Philosophy of Science in the Science Curriculum, *Virgil Hinshaw, Jr.* 272
An Avenue to Orientation to the Profession, *Melvin W. Green* 277
Some Notes on Teaching History of Pharmacy in the Extended Curricula, *Alex Berman* 282
A Course in Biological Products, *Louis Gershenfeld* 285
Human Anatomy in the Pharmacy Curriculum, *Russell D. Coleman* 291
A Course in General Pathology for Students of Pharmacy, *John S. Wellington* 296
Concepts of Drug Evaluation in the Dispensing Course of the Future, *John Autian* and *Alex Berman* 299
Half of Your Students Will be Hospital Pharmacists! *William M. Heller* 309
Animal Health Pharmacy, *N. M. Ferguson* 314
The University-Wide Honors Program at Washington State University, *Sidney G. Hacker* 316
Can Pharmacy Participate in an Honors Program? *V. N. Bhatia* 328

ARTICLES

The Status and Potential of the Course in Cosmetic Science, *Richard E. Faust* 332
Four Years of Experience With a Postgraduate Guidance Program at Brooklyn College of Pharmacy, *Isidore Greenberg* and *Arthur G. Zupko* 336
Trends in Hospital Pharmacy Education, *Elmer M. Plein* 342
The Graduate Hospital Pharmacy Program at North Dakota Agricultural College, *Muriel C. Vincent* 351
Report of the Committee on Curriculum, 1959, *John G. Adams* 353
Report of the Delegate to the AAAS, *Dwight L. Deardorff* 356

EDITORIAL 359
ANNOUNCEMENTS 362
NEW LITTLE PEOPLE 365
MARRIAGES 365
STAFF CHANGES 366
GENERAL NEWS 369
BOOK REVIEWS 375
NEW BOOKS 385

AUTHORS IN THIS ISSUE

Richard A. Deno, Professor of Pharmacognosy, University of Michigan (Ph.D. University of Michigan)

Virgil Hinshaw, Jr., Associate Professor of Philosophy, Ohio State University (Ph.D. Princeton University)

Melvin W. Green, Director of Educational Relations, American Council on Pharmaceutical Education (Ph.D. University of Pittsburgh)

Alex Berman, Assistant Professor of Pharmacy, University of Michigan (Ph.D. University of Wisconsin)

Louis Gershenfeld, Director of the School of Bacteriology, Philadelphia College of Pharmacy and Science (D.Sc. Philadelphia College of Pharmacy and Science)

Russell D. Coleman, Assistant Professor of Anatomy, University of California (D.D.S. University of Toronto)

John S. Wellington, Assistant Professor of Pathology, University of California (M.D. University of California)

John Autian, Assistant Professor of Pharmacy, University of Michigan (Ph.D. University of Maryland)

William M. Heller, Chief, Pharmacy Service and Assistant Professor, School of Medicine, University of Arkansas (Ph.D. University of Maryland)

N. M. Ferguson, Dean, College of Pharmacy, University of Houston (Ph.D. Washington University)

Sidney G. Hacker, Professor of Mathematics, Washington State University (Ph.D. Princeton University)

V. N. Bhatia, Associate Professor of Pharmacy, Washington State University (Ph.D. State University of Iowa)

Richard E. Faust, Director of Research, Potter Drug and Chemical Corporation (Ph.D. Purdue University)

Isidore Greenberg, Assistant Professor of Pharmacy Administration, Brooklyn College of Pharmacy, Long Island University (M.S. College of the City of New York)

Arthur G. Zupko, Dean, Brooklyn College of Pharmacy, Long Island University (Ph.D. Purdue University)

Elmer M. Plein, Professor of Pharmacy, University of Washington (Ph.D. University of Colorado)

Muriel C. Vincent, Professor of Pharmacy, North Dakota Agricultural College (Ph.D. University of Washington)

John G. Adams, Dean, School of Pharmacy, Duquesne University; Member AACP Executive Committee (Ph.D. University of Illinois)

Dwight L. Deardorff, Professor of Manufacturing Pharmacy, University of Illinois (Ph.D. State University of Iowa)

FEATURE SECTION

Editor's Note. The following twelve articles were invited by the Editor to provide the thoughts of the individual authors on some courses which should be re-evaluated or reconstituted in the extended curricula as well as to supply information on new programs and courses which may be undertaken in the extended curricula.

TEACHING PROFESSIONAL ORIENTATION

RICHARD A. DENO

I am not at all sure that the title of this paper is entirely correct—not sure that *professional orientation* can be taught. The pharmacy student is really obliged to work out for himself his relation to his profession, and if he has satisfactorily done this by the time he becomes licensed, he is to be congratulated. Early in his professional instruction, however, he needs to begin to consider pharmacy as it currently exists, its strong points and its weak points, its history, literature, ethics, associations, and its fields of specialization.

Such considerations are commonly termed professional orientation. The help given in a one-semester course to pharmacy students who are beginning to work out their relation to their profession is herein described. This course has been developed over a period of seven years, has never been given the same way twice, is constantly being changed, and will probably never become standardized. I doubt very much if the course should be taught in exactly the same way at another institution, but the experience herein described may be of some interest or help to other teachers.

Relatively little was published on professional orientation in pharmacy prior to 1950. The 1952 report by Blauch and Webster published as *The Pharmaceutical Curriculum* briefly refers to the topic, and the 1954 *Proceedings of the Teachers' Seminar on Pharmaceutical Education* has a number of papers and reports on professional orientation. The *American Journal of Pharmaceutical Education* contains occasional references to this topic in relatively recent issues, either in articles or in committee reports. Books designed for use in courses in professional orientation have recently appeared also—by Burlage, Lee and Rising, and by Deno, Rowe and Brodie. In addition, mimeographed outlines have been prepared by a number of teachers for use in their courses only.

ORGANIZATION AND GENERAL PROCEDURES

From the outset the course in professional orientation at Michigan was organized around the various fields of pharmacy practice: pharmaceutical education, retail practice, research and development, production and control, promotion and distribution, hospital practice, provision of drug standards, and regulatory activities. For each of these fields the nature, history, problems, ethics, associations, literature, and future developments are studied. This is in contrast to the organizational plan followed in certain colleges wherein the primary basis is topical, including at the same time such topics as history in all fields of practice, all pharmaceutical organizations, and the total literature of pharmacy.

Our experience with the approach by fields has been satisfactory, and we believe this plan of organization to be more interesting to the student and less tiresome than the topical plan.

As used in this paper, "we" is not the editorial we, but rather the several teachers who have participated in developing and teaching introductory pharmacy, the term we prefer for the course in professional orientation. For the usual entering class of around sixty students four teachers are involved in instruction, with one of the four assuming major responsibility but with each teacher helping to plan the course and prepare the examinations. A weekly meeting is held at which plans for the next week's work are discussed and possible future improvements for work recently covered are recorded.

For several years the course extended throughout the year, three hours per week, and included the introductory instruction on pharmaceutical calculations. It was felt that such instruction would be more meaningful when related to a specific field of pharmacy than when considered by itself. For example, problems involving such commercial considerations as mark-up and discount are readily related to study of the wholesale drug business. Reducing and enlarging formulas are easily related to pharmaceutical production. In many cases, however, such relationships are strained and further trouble is met in scheduling didactic considerations to coincide with the related calculations. The result was that the students soon came to consider introductory pharmacy as made up of two separate parts. Not infrequently a student would do well in the non-mathematical part of the course but fail to meet the passing requirements in calculations. This situation was troublesome and contributed to the reasons for separating calculations from the other introductory material.

One feature of our instruction in calculations, however, proved to be an improvement over the usual organization in such courses and has been retained in our current one-semester two-hour course in calculations. All types of problems are first considered in the metric system alone, throughout nearly one half the semester. Then the student is introduced to the common systems of measurement and to equivalents. All types of problems are then considered again, this time in the common systems. We believe this procedure to be less confusing than the usual plan wherein, for example, all types of percentage are considered at one time in all systems of measurement commonly met in pharmacy.

Early in our planning we determined to avoid lectures in the course in introductory pharmacy and to depend on mimeographed and printed material, study questions, demonstrations, field trips, discussions, and examinations, without recourse to formal lectures to the class as a group. We have adhered to this plan quite consistently except for a number of topics that experience has shown are best presented by lecture. In particular, coverage of current activities in pharmacy such as the Kefauver hearings and the advent of mail order prescription practice must be presented in lectures to the class as a group if the factual background is to be commonly held by all members of the class. Such lectures are given about every other week, as they can be worked into the schedule of field trips which occupy an entire afternoon the alternate weeks, when no lectures are given.

The trips include visits to retail pharmacies, hospital pharmacies, research laboratories, a wholesale establishment, and a manufacturing plant. They require from two to five hours each, and present certain problems of scheduling. The

problems have been solved at Michigan by scheduling the class for all afternoon on Wednesday, plus one hour at another time during the week for each section of fifteen to eighteen students. When trips out of town are scheduled, the students report at 12:30 Wednesday afternoon and usually return not later than 5:30. Local trips require less time, usually two hours or slightly more. When no trip is scheduled (every other week, on the average) the class meets in lecture group for one hour on Wednesday and this is followed immediately by a second hour meeting in sections. This is in addition to the section meetings held on days other than Wednesday.

The course as currently organized carries two hours credit. The *Profession of Pharmacy* by Deno, Rowe and Brodie is used as text, supplemented by a considerable body of materials some of which are listed in the following brief outline of some of the procedures followed for the various fields of pharmacy.

FIRST TWO WEEKS

Early in our experience we found a general discussion of pharmacy to be desirable during the first week or two of the semester. We believe this period should be one of rather slow and careful presentation of material that is studied again in other guise later in the course. As a consequence, we devote the first week to a consideration of pharmacy as profession and business, its general relations with other health professions, and its major ethical concepts. Each of these matters is again studied in detail later in the course, in fact, is referred to repeatedly during the semester. The plan of organization and presentation, and general objectives of the course are also discussed during the first week.

During the second week the various fields of pharmacy practice are referred to in the study of research, development, and mass production as illustrated by a single important relatively new drug—penicillin. To illustrate this study a film is shown, and the Squibb film *And the Earth Shall Give Back Life* has proven to be satisfactory.

By the end of the second week the members of each section have met with their instructor three or four times and have further become somewhat accustomed to the environment of the University. The practice of centering the informal discussions in the sections around the study questions of each chapter of the text has been established, as has the practice of introducing questions not listed in the text.

The students have also been introduced to the half dozen or so references listed at the end of each of the first two chapters and on reserve in the pharmacy-chemistry library. These references and all others listed in the text are on reserve. They are intended for skimming, in the hope the student may become sufficiently interested in some instances to read further; or merely to acquaint the student with a standard reference work, such as the *Dispensatory* or the *Red Book*.

Each student is required to subscribe to the *Practical Pharmacy Edition* of the *Journal of the American Pharmaceutical Association*. As current articles appear therein that relate to topics covered in our introductory course they are assigned and discussed in class. A problem in this connection is the long delay between sending the order and receiving the *Journal*—two or three months, in our experience. We are still attempting to obtain the first issue with less delay after the order has been placed.

PHARMACEUTICAL EDUCATION

This topic is introduced in the third week of introductory pharmacy. It had formerly been discussed toward the end of the course, but the students themselves pointed out that developments in collegiate instruction in pharmacy were of particular interest to students beginning such programs. They suggested earlier discussion of such developments, as well as reasons behind extending the program, curriculum, and types of colleges in the United States.

We have illustrated this topic with several of the slides in the Parke, Davis and Company *History of Pharmacy in Pictures* set, supplemented by a few slides of pharmacy college buildings throughout the country. We also use the AACP film *Time for Tomorrow* for illustration of the areas of supportive and professional instruction. Classroom discussions in recent years have almost always included rather extensive debate on the extended program of education.

Early in our experience with this course we became aware that many of our students failed to meet all the teachers in the college or see all the laboratories and other local instructional resources during their first year on the campus. As a part of our coverage of pharmaceutical education we make it a point to have every student in introductory pharmacy meet every instructor in the college of pharmacy, and in many instances talk with him about his work. We also make sure every student learns about all instructional resources of the college itself during the course. These contacts are not necessarily made at the time pharmaceutical education is first presented as an area in pharmacy, but some of the local personnel and resources are seen then and others introduced in other connections later in the term. By the time the course has been completed each student knows something of each teacher, firsthand, and has at least seen all the physical resources of the college for both undergraduate and graduate instruction.

GENERAL PHARMACY PRACTICE

Three weeks are devoted to the study of retail pharmacy—its origin in the United States, discussion of some of the factors that may have been responsible for the characteristic nature of general pharmacy practice in our country, and some of the features of the different types of retail outlets that have developed here. The organizations and literature of interest to American pharmacists are considered at some length.

Students are taken in groups of from fifteen to eighteen to four local pharmacies. About twenty minutes are spent in each store. Each group is shown the prescription department, stockroom, and general sales area of each store. Such routine procedures as receipt of prescriptions by telephone, filing of prescriptions, and handling of merchandise received from wholesalers are explained. Ann Arbor does not have an exclusive prescription pharmacy, but one of the pharmacies visited is not far removed from this category if camera and cosmetic departments are overlooked. This store has an unusually large and busy physicians' supply department. Two other stores are rather superior drugstores, with most of the sidelines ordinarily found in drugstores but without soda fountains or related departments. Each of these pharmacies enjoys an excellent prescription business and each store is exceptional for its good housekeeping. The fourth outlet is a typical, large, well-run chain drugstore.

A relatively large percentage of pharmacy freshmen at Michigan have not had work experience in pharmacies, and these students in particular gain from

even this rather cursory inspection of behind the counter operations. Even students who have had experience in one or more pharmacies are interested to look behind the scene in other stores. With the exception of questions on volume of sales, the pharmacists visited are glad to answer almost any question from a student. We make detailed arrangements prior to the visits each year, of course, and have the impression that the pharmacists visited are pleased to cooperate in this project.

From assigned readings and following the visits to the local pharmacies background is developed for rather extensive discussion of the types of drugs in current use. Each student is asked to bring to class half a dozen or more drugs, and fifteen or more students usually provide a section meeting with a considerable variety of items. Discussion of these drugs usually brings out such classes as official versus unofficial products, prescription legend drugs, prescription specialties versus home remedies, and a rather wide variety of therapeutic classes of drugs. The matter of drug names is discussed—trademarked, generic, official, and chemical names. Newspaper stories dealing with nomenclature as covered by the Kefauver hearings have made this exercise especially timely during the current semester. Such stories are discussed in some detail in the section meetings.

RESEARCH

A period of two weeks is spent studying the scientific background of the profession of pharmacy and the nature and extent of current pharmaceutical research. We have in the past visited certain University research laboratories and special facilities concerned with pure research, such as the cyclotron and nuclear reactor. We found that such resources were too remote from pharmacy, at least in the experience of first year pharmacy students, to be of much meaning, and these trips have now been deleted from the program.

The same disadvantages from lack of knowledge and experience prevail to a considerable extent when laboratories devoted to basic and applied research in pharmaceutical areas are visited and the work being undertaken is explained. It is almost impossible to give a student in the first year of professional study much of a grasp of the physical and chemical problems involved in product development. Likewise in research in progress in synthetic and analytic chemistry, and in pharmacology and pharmacognosy. These disadvantages notwithstanding, visits in small groups of eight or nine students to six or eight research laboratories are undertaken, and we believe impressions remain that help the student to begin to appreciate the nature and complexity of pharmaceutical research. At the very least the student meets professors and graduate students in the several areas, and sees the type of equipment and processes involved.

To guide six or seven small groups through the various research laboratories and introduce them to the personnel in these laboratories requires several more people than are involved in teaching the course. Members of the local chapter of Rho Chi have helped in this part of the program, one upperclassman or graduate student to each small group. The Rho Chi members have prepared mimeographed outlines of the professional areas in which pharmaceutical research is undertaken, with special reference to personnel and facilities at Michigan. At possibly one half of our colleges such an approach may not be possible or feasible. In such instances a number of films are available depicting research activities in such industrial concerns as Lederle, Pfizer, Upjohn, Lilly, and Parke, Davis.

MANUFACTURING AND CONTROL

Two tours are involved in our study of the pharmaceutical industry—one through the manufacturing and analytical teaching laboratories of the college, the other to Parke, Davis and Company in Detroit. The local tour is made in groups of fifteen to eighteen students, and the professors in charge of manufacturing pharmacy and analytical pharmaceutical chemistry respectively brief the students on the relationship of their programs to the pharmaceutical industry.

The trip to Parke, Davis and Company takes about five hours, and about half this time is available for a rather hasty visit to their manufacturing facilities in Detroit. This visit, obviously, it not comparable to the two-day visits to manufacturing plants undertaken by seniors in most colleges of pharmacy, but the briefer visit accomplishes the purpose of introducing the student early in his academic years and at first-hand to the mass production of pharmaceutical products.

Many colleges of pharmacy are not located near one or more pharmaceutical manufacturers, and an afternoon's visit to an industrial plant cannot be readily arranged. In such cases, films available from several of the larger pharmaceutical manufacturers may be shown instead. The thirty-two minute sound, color film *A Day at Upjohn* can be recommended for this purpose.

DISTRIBUTION AND PROMOTION

These topics are considered together, with the principal emphasis on promotion and distribution of prescription specialties. At this point help is solicited from personnel outside the college. A medical service representative is invited to demonstrate his role in the promotion of pharmaceutical specialties and to discuss his work. The demonstration consists of a simulated call on a pharmacist, followed by a simulated visit to a physician. These sketches are followed by a brief outline by the detail man of his training and work, and by a question and answer session. For this presentation to proceed smoothly and effectively rehearsal is necessary. The roles of pharmacist and of physician are taken by teachers in the course, and a third teacher acts as moderator throughout the demonstration. We have felt that this procedure has been effective, and it offers a change in presentation that seems to be welcomed by the students. Other than in this instance, we have not found personnel outside the college to be effective in the introductory course. This criticism does not apply to our senior seminar wherein many outsiders give their views on various facets of pharmacy practice.

To give some coverage to promotion of over-the-counter items each student is asked to clip a half dozen advertisements of home remedies from newspapers or magazines, and to write critical comments concerning them. Despite the pronounced changes in such remedies over the years and in their promotion, a surprising number of fantastic statements still appear. Students are also asked to listen for and criticize radio and television advertisements of home remedies.

The role of the wholesaler in the distribution of drugs and other items commonly found in pharmacies and drugstores is demonstrated by an afternoon's visit to a modern drug wholesale establishment. Two such plants are within a radius of thirty-five miles of the College and one or the other is visited by each class. About two hours are spent at the wholesale house. Opportunity is given to see all phases of the operation, in small groups of not over ten students each. Key personnel in the various departments serve as guides and describe

their duties. Opportunity is given for questions, answered by the various department heads.

HOSPITAL PHARMACY

Visits again help materially in giving to the student a general idea of the environment and type of work of the hospital pharmacist. Three large hospitals and the University Student Health Service (essentially a small hospital with a large outpatient service) are available for visits. At least two of these units are visited by each class, and the large University Hospital is always included. Here both outpatient and inpatient pharmacies are visited, as well as the manufacturing laboratories of the Hospital.

Since much of the work of pharmacists employed by the federal or state government is in hospitals, pharmacy in the governmental service is considered along with hospital pharmacy. If time permits, the VA Hospital is visited, and this trip enables firsthand observation of pharmacy service in a governmental unit, as well as observation of such departments as central supply, the clinical laboratories, and physical therapy.

LEGAL STANDARDS AND REGULATIONS

Materials used to help explain the procedure of revision of the *USP* and the *NF* include files of correspondence and circulars, and galley and page proof for each book. Complete sets of both *USP* and *NF* are available for comparison, as is *NNR* (and *NND*) and *Drug Standards*.

In our study of federal and state laws affecting pharmacy particular emphasis is placed on the state regulations that may affect the student prior to the time of his graduation. Each student is furnished a copy of the Michigan Board regulations and policies on internship. Students from other states are urged to obtain corresponding materials for their respective states.

We have never felt that our presentation of the introductory material for any of the areas covered was not subject to improvement. Each year, therefore, variations in approach have been sought and new illustrative materials have been used. Booklets and brochures from many sources are furnished each student from time to time as they serve to illustrate a topic under consideration. These materials change from year to year as new or improved editions become available.

The experimentation extends to examinations, usually two during the semester and a final examination. Combination of objective questions of the multiple choice type and essay questions have proved to be reasonably satisfactory for enabling us to cover a fairly wide variety of material but also provide opportunity for more thorough discussion of one or two topics.

The seven years experience we have had with this elementary but important introductory course has convinced us of the soundness of observations voiced in 1954 at the Storrs Seminar by Dean Tice of the Philadelphia College of Pharmacy. He referred to instruction in professional orientation as a challenge for all teachers of pharmacy. It is a challenge—the attempt to engender respect and enthusiasm for his profession in the student of pharmacy as well as a realization that a life of service lies ahead, coupled with rewards both material and in terms of lasting satisfaction. Dean Tice pointed out that the teacher must bring to this course vision and dedication, and to these attributes we would add a lively sense of imagination and a willingness to experiment every time the course is offered.

PHILOSOPHY OF SCIENCE IN THE SCIENCE CURRICULUM

VIRGIL HINSHAW, JR.

I want to consider briefly the philosophy of science and the reasons why I think it should be included in the science curriculum. Here as always, I believe, the proof of the pudding is in the eating. My justification for including it will thus take the form of a sketch of the ways in which science students of mine have come to a deeper understanding and appreciation of science in my philosophy of science course. But, first, a word about the philosophy of science itself.

Unlike philosophy proper, philosophy of science is about science. Within a common-sense context shared by the unsophisticated laboratory attendant and theoretical scientist alike, the philosophy of a given science analytically describes the nature and structure of its concepts, of the laws in which its concepts appear, and of the theories into which these laws combine. Rather than, like the scientist, observing and experimenting, discovering laws and framing theories, the philosopher of science asks about the status and function of law and theory in science. Rather than inferring consequences from laws of nature or further laws from extant theories, he describes analytically the interplay within science of induction, deduction, and theory. He is, moreover, concerned with broad descriptive features of science and its methods. He probes, for example, the status of causality and determinism, and seeks to describe and separate the welter of complex issues involved in a correct interpretation of recent physical theory. He is, thus, interested in the accurate portrayal of the status of atomic conceptions—of (say) such terms as "gas molecule," "electron," and "Psi-function."

Now just what, for example, does the student of philosophy of science learn about science? He will, I believe, recognize for the first time just how ambiguous the term "scientific method" is. If, for example, "method" refers to specific procedures, such as the use of certain instruments and techniques, then the number of methods is indefinitely large and always growing. But what about *the* scientific method? Here we must first strip away the honorific uses of this ambiguous term. Next, we must note that, if what is now meant by method is a set of rules, like a recipe in a cookbook, which if heeded must lead to the discovery of laws and theories, then there is no scientific method. If, however, what is meant is that scientists observe and experiment, try to find laws, and sometimes combine laws into theories, then there is a method that we may label the one and only scientific method.

Having seen this, the student is no longer tempted to distinguish amongst the sciences by referring to unique or special methods of given sciences. He will, moreover, realize there is no method of discovery but rather a method of criticism of or check upon guesses, hunches, or hypotheses—however arrived at. He will recall Archimedes' bathtub "Eureka!," the possible influence of Kepler's numerological divinations on his discovery of the laws of planetary motion, Newton's encounter with the falling apple, Poincaré's discovery of the fuchsian functions while boarding an omnibus, and Hamilton's flash of insight into the fundamental equations relating I, J, and K, as he approached Brougham Bridge

on a walk with Lady Hamilton. Apocryphal or no, these accounts illustrate the largely accidental ways in which important discoveries have been made. But however such insights are attained, they must be checked by the one and only scientific method. This method, the student concludes, must therefore not be confused with the psychology of discovery or any so-called "logic of discovery." This point is surely obvious once we consider how successfully we have applied scientific method in physics while knowing practically nothing about the psychology of discovery.

In studying the philosophy of science, the student likewise begins to appreciate the diversity of objects under scientific investigation. He may never before have adequately considered the difference between *material things*, such as rocks, trees and planets, and the many *non-things* that science invokes—the manifold patterns, structures and relations, such as temperature, elasticity coefficients, electrical fields, and intelligence quotients. But he must also learn to gauge the more important difference between things and non-things *and* the *basic entities* of physical theory—from the imaginary gas molecules of the nineteenth century to the nuclear "particles" and Psi-functions of recent quantum mechanics. Such basic entities, he discovers, are only partially coordinated to the empirical hierarchy of concepts of the thing and non-thing variety. Average kinetic energy of the gas molecules, for example, becomes only a statistical function of their mass and velocity, and is coordinated with the empirical concept "pressure," yet neither the mass nor velocity of single molecules is individually coordinated. And thus the student comes to understand that the statistical nature of statements about such basic entities is built into the models that enable the scientist to talk at all about such entities. In noting such differences among the objects of scientific study, he likewise becomes sensitive to the complexity and the dialectical character of the present situation in modern science.

In his study of logic and theory construction, the student of philosophy of science will, moreover, develop an appreciation of the tremendous strides that have recently been made in logic and mathematics. He encounters the rigorous procedures of formalization and axiomatization—the building of deductive systems and scientific calculi. He becomes cognizant of precise distinctions between logical and descriptive words, between logical and factual truth, between pure and applied systems, and the like. He becomes more and more proficient at pinpointing difficulties and misunderstandings in current controversies, like those involved in probability theory and measurement. And he likewise learns why scientists increasingly turn to the newer branches of pure mathematics as they seek models for relationships, laws, and theories.

As he inquires into the principles of definition and the methods of concept formation, the student will come to realize the importance of linguistic aspects of science. Here sophistication results, for example, in an awareness of the reducibility of all terms in the empirical hierarchy of concepts to those lying on a common verification basis. The student may well become disillusioned as he traces the vogue of "operationism." Here he finds that its early advocates frequently confused the "recipe" (the routine prescribed by the operational definition) with the "pie" (*what* the prescribed routine elicits). He likewise discovers that some psychologists presumably believed operationism provided rules that would automatically lead to discovery of relevant variables and, hence, of fruitful concepts. Yet from study of such mistakes the student will profit.

He will thereafter be less impressed with attempts to generalize an insight into a whole "school of thought" or "methodology." The science student can also learn much from mistakes in arguments about classification and taxonomy. As he investigates problems of classification, he will be taught to recognize different uses of the verb "is." He will learn to distinguish the "is" of identity from that of class-membership and of class-inclusion, and to distinguish all these from the "part-whole" relation. Once he becomes clear about such distinctions, he will recognize idle disputes about the existence of species for what they are even when the disputants are reputable biologists.

The young scientist who pursues philosophy of science will, finally, gain a clearer grasp of the differences between factual statements, value judgments, and moral claims, and will thus come to understand the reasons for distinguishing science from ethics. That these distinctions be validly drawn is immensely important, and I believe a place for the philosophy of science in the science curriculum can be justified solely by the contribution it can here make to the student's understanding. I should like, therefore, to examine in greater detail some of the issues involved.

We all presumably know, for example, that scientific knowledge is power, but for evil as well as for good. It is usable just as effectively for evil as for good purposes. It is usable equally to destroy or create, to maim or heal, for oppression or for freedom, to wage war or to maintain peace. This, of course, is what is meant when it is said that scientific knowledge is wholly neutral with respect to values and moral claims. But still many confuse the role of the scientist as scientist with his role as citizen and policy maker. And this confusion is often compounded with the belief that there can thus be no science of man—no science of human behavior, no genuine knowledge of how man came to be as he is.

Thus it is often urged that the social sciences can never become scientific like physics because their subject-matter is "value-charged" or "value-impregnated." They are concerned with matters of vital human interest; they involve human values. Physical science studies neutral facts, and any behavioral science modeled after physics is bound to trivialize man's moral concern.

History is frequently singled out as in this respect unamenable to scientific study. Unlike the natural sciences, observes Nevins (for example), "history is violently personal . . . stars and molecules have no loves or hates, while men do." As Nagel (1) points out, however, there is no foundation for the claim that historical study is addressed exclusively to "value-impregnated" occurrences. There are many historical investigations that are not of this nature, to wit, inquiries into the development of stars, biological species, geological formations, and the like. But the central point that Nagel makes is that even when the historian is treating "value-charged" subject-matter or occurrences manifesting various passions, it does not follow that he must share or judge those values or passions. "He who drives fat oxen must himself be fat" is an obvious fallacy. Yet it is equally fallacious to maintain that one cannot study the conditions and consequences of values and evaluations without necessarily making moral or esthetic value judgments. To study values, aspirations, and moral principles of past ages it is surely not necessary to moralize about them. The historian need only be concerned with what was believed valuable or right, not with what is, in some sense and for some peoples, valuable or right. And

the fact that we frequently detect and criticize evaluative accounts and interpretations of the past illustrates in a striking manner the fact that we expect historical knowledge (as opposed to much history as it is written) to be objective or neutral.

Yet, more generally, it is often claimed that the social sciences cannot be value-free because the behavorial scientist himself cannot help having social preferences. This is, as Passmore (2) observes, obviously true. An interest in social policy is usually what originally leads the social scientist to the social field, and this interest largely determines the sort of problem he concentrates on. This objection appears fatal, however, only if we think of *physical* science as an exercise in pure reason, in which the physicist lays aside all human passions. But, as Passmore concludes, this would simply be bad psychology. A man's special interests lead him to physics and to particular problems therein. Surely anti-theoretical passions are more likely to be aroused in the social field than in the realm of inanimate nature. Yet this simply makes social science more difficult, but not impossible.

What we must, as philosophers of science, do here is distinguish matters of fact from matters of policy. The behavior scientist, as scientist, is legitimately concerned with both theoretical and technical matters of fact. Theoretical (including historical) problems can be settled by finding out what happens—by discovering the ways things work in the field of human relations. How, for example, do institutions come to be as they are? This theoretical question has a factual answer discoverable by application of scientific method. On the other hand, a problem of policy (such as, "Ought we to integrate all public schools?") is not resolved in this manner. Two people might agree that integration would enhance American democracy but engender the conditions for intermarriage. The one argues: It follows that we should integrate the schools. The other maintains: It follows that we ought not to do so. Now how can we decide which person is right? Actually, neither is right since nothing follows from their opinions (however well substantiated by social science) about American democracy and intermarriage as to what ought to be done. We are still left with our policy or moral decision after the social scientist's work is done. Policy will be determined in the light of matters of fact, but is not deducible from them (2).

The upshot of these distinctions is that there are questions in the social field (as opposed to social science) which are not matters of fact. When questions of policy arise, the social scientist, as scientist, can provide data and theoretical conclusions that make discussion of policy possible; for to discuss a policy is to make testable assertions about its character and consequences. And what social science provides are just such testable (and tested) assertions. But we must also acknowledge the complexity of the situation in which the scientist is consulted as *expert*. When he is thus consulted, as *citizen* he usually shares a common moral outlook with the planners. The values that co-determine the particular policy are already agreed upon, and when he professes, as scientist, to give merely technical advice, he sometimes forgets that his advice must not conflict with these shared, unstated evaluations.

Such, then, are some of the features, aspects, and limitations of science which a student of the philosophy of science encounters (3). I do not personally see how the advanced undergraduate and graduate student of science can afford to miss the opportunity, presented in such a course, to study science in this

manner. It has been my experience that science students thereby gain quickly a sophistication about science that many practicing scientists never achieve despite many years of research and theorizing. And there has never been a time when the need was so great for good scientists who are keenly aware of both the possibilities and limitations of science.

REFERENCES

(1) Nagel, Ernest, *Scientific Monthly*, 74, 162 (1952) (Reprinted in "Readings in the Philosophy of Science," H. Feigl and M. Brodbeck (Editors), Appleton-Century-Crofts, New York, N. Y., 1953, pp. 688-700).

(2) Passmore, J. A., "Proceedings of the Tenth International Congress of Philosophy," North-Holland Publishing Company, Amsterdam, 1949, p. 1024. (Reprinted in "Readings in the Philosophy of Science," H. Feigl and M. Brodbeck (Editors), Appleton-Century-Crofts, New York, N. Y., 1953, pp. 674-676).

(3) Bergmann, Gustav, "Philosophy of Science," University of Wisconsin Press, Madison, Wisconsin, 1957. (Recommended for further discussion of such aspects.)

If we were to bestow a prize for the most inane statement made about pharmaceutical education in 1948, it would go to the man or men who said that a four-year course is sufficient for the practice of retail pharmacy, but that a six-year course is necessary for those who wish to go into research or manufacturing or an educational career. Such a statement is equivalent to one that a medical man might make which would read—"A four-year course in medicine is sufficient for a doctor who wishes to practice general medicine in the country, but a six-year course is necessary for those who wish to practice in the city, or who wish to go into a specialty." We have never heard a doctor make that statement, nor have we seen it written in medical literature.

Rufus A. Lyman, Am. J. Pharm. Ed., 13, 189 (1949)

AN AVENUE TO ORIENTATION TO THE PROFESSION

MELVIN W. GREEN

Traditionally we are accustomed to looking at the curriculum for pharmacy in terms of the five professional areas, a view which tends to put emphasis upon the individual facts and concepts and which tends to fragment the curriculum. There are other ways of looking at the curriculum, also, and one such way is, in a sense, a chronological or historical one. In this view one thinks of the goal or goals of the total curriculum in terms of developing in the student the appreciation for pharmacy as it has existed in the past, the profession as it is now practiced, and the conditions under which the profession will probably be practiced in the future either in fact or in ideal.

This paper is limited to the latter approach with emphasis on the present and future because it is believed that instruction in the five basic areas of the professional curriculum is now reasonably satisfactory. While there are weaknesses that can be ascribed to the teaching of pharmaceutical chemistry, pharmacy, pharmacognosy, pharmacology, and pharmacy administration, these subjects have been threshed over so many times at the various teachers' seminars, the teachers' conferences, and by the curriculum committees of the Association that there is reasonable understanding of what is expected in these various areas.

The strictly historical evaluation of the profession has been covered reasonably well, also, in courses in the history of pharmacy and in the orientation courses usually given at the beginning of the professional phase of the pharmaceutical curriculum. The American Institute for the History of Pharmacy has been especially helpful in inculcating an appreciation of the historical approach to the study of pharmacy.

It is not only the bare historical facts and statistics which have been of service, however, but the appreciation that many problems and practices of the profession are the results of normal historical growth as well as an appreciation of pharmacy's position in societies of the past which have been so useful in enhancing the prestige of the profession. The writer does not feel qualified to discuss in any detail the importance of this area of study.

There has always been a great deal of attention paid to the so-called "practical" side of pharmaceutical education and training in the profession of pharmacy. It will be recalled that training for pharmacy practice was originally only an apprenticeship proposition in the United States and that apprenticeship even though it has been qualitatively changed into an internship approach is still considered a valid and important part of the training of the young pharmacist. This is not the sort of practicality referred to here, however.

In educational circles, there is a growing appreciation for the need to teach students to think like the professionals in the area of their study. It is not enough to teach the rudiments of chemistry to a chemistry major, for example, but one should attempt to teach the student to think like a chemist or to approach a problem like a chemist presumably approaches it. By the same token we should be attempting to teach students to think like pharmacists in their approach to various pharmaceutical problems. This is practical education.

While it is true that a pharmacist is occasionally asked for a small bit of information which can be clearly isolated into one of the five professional subject areas, ordinarily this is not the case. Upon many occasions, the pharmacist will be expected to draw upon his general knowledge in any or nearly all of the five areas, integrate this knowledge, and come up with a value judgment based upon this broad understanding derived from the many areas. One of the tasks of pharmaceutical education should be to stimulate the student's ability to do this type of thinking near the end of his formal pharmaceutical education. This type of problem solving and development of attitude is much more related to the general process of thinking than it is to the mere regurgitation of facts.

Undoubtedly there are many ways of attaining goals of this sort. Perhaps within limits they can be achieved by lecturing about the process, but in the opinion of the author this technique is not as effective as student discussion. These goals are achieved to a certain extent in the dispensing courses, but ordinarily the view is too limited at this juncture and frequently the size of the class or section is too large for effectiveness. It would seem to the author that one important way of developing this point of view is through the undergraduate seminar.

Sound university educational philosophy is coupled with the attempt to live many years ahead of the times in many respects. Universities recognize that they should be preparing students to be effective in their respective professions and vocations fifteen or twenty years after they have graduated when they will have reached the peak of their careers. Such an outlook gives the colleges of pharmacy an opportunity to exercise considerable influence over the profession of the future if they are imaginative in their approach to pharmaceutical education.

Possibly no one can predict the future with any degree of certainty in the highly mobile social climate that prevails in the world today. Trend lines can be drawn, however, and one can stimulate thinking concerning possible future facets of the profession in a future society. Accrued thinking habits can be expected to carry over, at least to a degree, into the future life of the individual. Many matters are approached from a rather idealized state in the colleges, and I think most of us would be surprised to realize how many of these ideals are capable of some reasonable measurement of attainment when inculcated into the minds of young people with vision and ideals.

In thinking of these kinds of approaches to teaching, let us take the area of professional literature as an example. It is customary in many schools to teach the use of professional literature in special courses. In addition, the various instructors resort to library assignments in various ways in their courses. In general, the literature is used, however, to acquaint the student with the peculiar literature of a relatively small segment of professional knowledge. The student is taught how to locate specific factual data on the chemistry of individual compounds, how to find in the literature methods of synthesis or analysis, how to find the effect of a given drug on a specific physiologic system, drug dosage, side effects, etc. He is taught also the use of the principal reference works of the pharmaceutical field such as the *Pharmacopeia,* the *National Formulary,* the *Dispensatory,* and the text-reference books. In some instances he is even introduced to the foreign literature, particularly if he exhibits an interest in research.

In the average pharmacy of today, the pharmacist is apt to be quite limited in his information sources. He probably subscribes to one or two professional or trade journals, he generally possesses a *Pharmacopeia* largely because he is required to do so by law, and he may have a few general references. Any remaining literature is apt to be that which has been supplied by the makers of the various pharmaceutical products that he handles. More thoughtful pharmacies are expanding their subscription lists and reading what the physician reads.

The author is familiar with one prescription pharmacy that holds literature seminars as regularly as once a week. In this seminar the individual pharmacists call attention to unusual developments in the journals that they have been assigned to scan regularly and one pharmacist prepares a paper of some length reviewing the present status of a drug, group of drugs, or similar matters. These literature seminars function in about the same way that journal clubs are handled at the university except that stress is given to the professional application of information rather than to its possible research potential. No doubt use of literature seminars will grow in other pharmacies where the staff is of sufficient size to warrant it.

The author has noted, also, that in one large metropolitan area a number of drug journal clubs have been established during recent years. These clubs are deliberately kept to a size not exceeding twelve or fifteen members who meet regularly in one another's homes for the expressed purpose of keeping abreast of the drug literature. The members of the clubs arrange to subscribe to various journals and have access to others through the local medical society, public library, and other sources. This is a technique that can be spread easily through large urban complexes and can even be used in somewhat more rural areas with today's possibilities of transportation and communication. Obviously the colleges of pharmacy should be preparing students to function in this type of practice.

It has been noted many times that a number of new drugs and classes of new drugs are appearing with considerable rapidity upon the pharmaceutical scene. Five years after a student has graduated from college, a sizable number of drugs that he has learned a great deal about will have nearly disappeared from the scene, and he will be confronted with many new products. We also have the problem of considerable variation in the education and training of the practitioners. It is important for the advance of the profession to attempt to reach back into the somewhat older group of pharmacists and aid them in some of the approaches to a more modern understanding of drug therapy. This is being done at the present time through various seminars and congresses of practicing pharmacists, but the programming of such seminars has been rather haphazard in terms of really systematically educating the practitioners. Perhaps it is not possible to reach the older practitioners effectively by such devices, but the habit of continuing education can be established in the present day students and recent graduates, and this should be done in a well-planned manner.

One possible approach to this type of educating for professional practice is through the undergraduate seminar. One college has used this technique with considerable effectiveness. The student body was divided into small groups, never larger than ten, and each such group was assigned to meet with one faculty member. Each faculty member participating in the seminars was assigned a definite discussion topic for development.

This instructor carefully worked up source material and case studies in his area so that he could be an effective resource person. The teacher did not instruct, but led discussions only. Every attempt was made to persuade every student to discuss the various questions that arise in the topic under discussion. the discussions were kept informal, and no attempt was made to reach conclusions. It is far better to get the students to discuss and to think about the problems of the present and future of pharmacy than it is for them to reach pat answers. Grades were given on the basis of the students' participation in such discussions. The instructors were moved on to a new group of students after about four hours, so that, by the end of the semester or year, the student had a chance to participate in the discussion of each of the various topics that had been selected for discussion.

There were many topics discussed in these small seminars. One teacher was in charge of several sessions to discuss the general problems that arise from the fact that the services of a pharmacist revolve around a commodity and the attendant commercial considerations. Another teacher confined his discussion to the general proposition that a pharmacist of today and the future is less of a manual worker and more of an advisor or consultant relative to drug matters. Still another teacher held discussions relative to problems of developing and enforcing satisfactory codes of ethics. One instructor held discussions concerning professional relations, problems of pharmacy, and, particularly, means whereby the pharmacist could produce a better professional image in the public mind. One instructor limited the discussion he moderated to the problems of pharmaceutical education, encouraging the students to discuss education as they had experienced it and letting the students into some of the deep recesses of the faculty's minds relative to problems that they faced. One instructor moderated discussions on research and graduate education in pharmacy and allied sciences so that all students had an opportunity to see some of the problems in this area and begin to think for themselves about their possible interest in entering such areas. A discussion was held by another instructor on the problems of organized pharmacy, its strengths and weaknesses, and possible future. It is difficult to imagine a better place to start the student on his way to becoming a leader in the profession than through a discussion of this sort.

In addition to the information gained by the students, the attitudes that were developed, and approaches to their careers that were furthered by this technique, an important by-product was a development of the ability to think on one's feet and to speak extemporaneously relative to the various aspects of the profession. It was the opinion of the faculty that there was a noticeable enhancement of the pride of being a pharmacist on the part of the students as they began to participate in these discussions. Since pharmacists will be expected to address service clubs and community groups relative to pharmaceutical and health matters, an undergraduate seminar of this type can be very useful in helping the person to accomplish this. A pharmacist will be expected to address his fellow pharmacists at various pharmaceutical meetings also, and this too is enhanced by discussion groups of this sort.

It is not suggested that all schools develop a program in precisely this pattern for there may be better ones. But for those that do, there are some general points of emphasis relative to the success of any such program which might be cited such as: (1) the teacher must be well informed about the area that he is to moderate, but he must be capable of keeping in the background only using

himself as resource material and as the moderator. This is not the place for the teacher to lecture, but is a place for all students to discuss actively. (2) The student should have almost complete freedom of expression. The only corrections that should be made might be relative to a moral or ethical matter that the teacher feels needs correcting. The student in fact should be encouraged to "think out loud" to "brain storm" and to give his imagination free rein. Any ideas that seem somewhat "wild" will soon be tamed down by the rest of the students. (3) When points are brought out relative to conditions in the profession at the moment, the teacher should attempt to bring out why things are as they are. At the same time, where reform within the profession would appear to be in order, the student should be encouraged to think about ways in which such reform could be achieved. (4) It would be helpful to have individual sessions tape recorded and played back before the entire pharmacy faculty so future programs could be improved. (5) In most instances it is well to advise the students in advance of the discussion topics so that they will have time to think about them. In some instances, the students might be assigned selective reading either before or following the discussion of a given topic.

When the colleges of pharmacy have the vision to see their service to the profession and the public in terms of human needs, and when the colleges are adequately supported so that they are able to adapt their programs to the expanding view of pharmacy as a great health service, then, and then only may we look forward with assurance to a profession whose members will justifiably take pride in being a part of it.

Lloyd E. Blauch, Am. J. Pharm. Ed., 13, 468 (1949)

SOME NOTES ON TEACHING HISTORY OF PHARMACY IN THE EXTENDED CURRICULA

ALEX BERMAN

The reasons which have already been advanced for teaching history of pharmacy in the four year curriculum might justifiably be restated with added urgency as our schools of pharmacy initiate their expanded programs. These reasons were cogently presented by Sonnedecker (1) in 1955 at a teachers' seminar, when he ably demonstrated the objectives and functions of history of pharmacy in education. In view of the rapid transformations in pharmacy and the health professions under the impact of socio-economic forces, the purposes and values of pharmaceutical history should become even more apparent. Consider, for example, the statement of a distinguished medical historian and professor of public health (2), whose appraisal of medical history applies with equal force to pharmacy:

> At present, we are more than ever aware that modes of practice are changing, and that medicine branches out in new directions under the pressures of industrial change, demographic development, war and shifting economic conditions. This means that the responsibilities of the physician today are more far-reaching than they have been in the past. These changes require of the medical profession an understanding of the medical past in relation to the present so that the future may be fixed more clearly. This understanding the medical historian can provide, but only if he takes his stand on the social level. By linking the development of medicine with the history of politics, economics, science, religion and art, medical history can lead the physician to discover the forces which have shaped us and that may reach into the future.

History will not provide a ready-made solution to contemporary problems in pharmacy, but it will frequently offer stimulating insights and interesting parallels in planning for the future. History of pharmacy thus has an intrinsic pragmatic function as part of its cultural and intellectual content, an aspect which I have always sought to emphasize to my students.

CURRENT STATUS OF TEACHING HISTORY OF PHARMACY

In 1952, Sonnedecker and Urdang (3) surveyed the teaching of history of pharmacy in schools of pharmacy throughout the United States. From the information sent in by forty-eight schools of pharmacy, the authors were able to tabulate the criteria used in selecting teachers of pharmaceutical history. The qualifications upon which this selection was made were as follows:

Professional historian	2
Former student of Edward Kremers	2
Personal interest	15
Personal interest plus knowledge	11
Personal interest plus ability	1
Personal interest and enthusiasm	1
Experience (in pharmacy or education)	6
Best available	4
Willing	2
No one else willing	2
Uncertain as to reasons	2

Interpreting this data, the authors correctly concluded that "It is true as some say that 'anyone can teach history of pharmacy,' at least after a fashion. And our study shows that almost 'anyone' may at present do so!" This brings

us to three fundamental questions concerning the teaching of pharmaceutical history: (1) what should the qualifications be for teaching this subject? (2) what should be taught? and (3) how should it be taught? The late eminent historian of science, George Sarton, once wrote (4), "It is not very helpful to know that Prof. John Doe gives a course on the history of science in the University of Podunk. One would like to know what kind of course he is giving and what are his qualifications."

The Sonnedecker-Urdang survey (5) of 1952 ended on an optimistic note: "A burgeoning interest in socio-historical study of the professions, and of civilization at large, seems to be reflected in current attitudes of administrators in pharmaceutical education." Whether this optimism was justified is debatable. To be sure, the wave of interest started by Kremers and Urdang at Wisconsin is not spent, and strong ripples continue to emanate from Madison. It is possible that some day one or more schools may want to emulate Wisconsin, but at the present time there appears to be no basis for optimism on that score. The teaching of pharmaceutical history in most schools of pharmacy in this country has probably remained unchanged in the last decade. Except for a very few people trained for the most part at Wisconsin, courses in this area are being conducted by teachers whose backgrounds are as varied as the history courses they offer. I agree with Professor Erwin H. Ackerknecht, presently Director of the *Medizinhistorisches Institut* of the University of Zurich who, commenting on the teacher of medical history (6), stated: "Whether teaching full-time or part-time, he should be trained sometime, somehow . . . complete self-training, admittedly successful sometimes, is in many ways a waste of time."

THE BASIC HISTORY COURSE IN THE EXTENDED CURRICULA

For several years, I have given a basic survey course to upperclass and graduate students, and have found that three semester hours constitutes the minimum time in which I can effectively present my material. Actually, this is the minimum amount of time recommended by Blauch and Webster (7). It is highly desirable that the course be given after the student has taken some professional pharmacy subjects.

There is no glib answer to the questions as to how and what should be taught in this basic course. Kremers and Urdang have, of course, shown how historical material can be organized in their valuable survey and guide, *History of Pharmacy*. But there are alternatives, and the progressive teacher will always try to introduce fresh material and use flexible organization. Certainly, there is no lack of factual sources from which to organize the course content. One need only refer to some of the historical bibliographical citations discussed by Sonnedecker, Hoch, and Schneider in a recent issue of this journal (8), to be aware of this. The reservoir of knowledge in pharmaceutical history is steadily growing, as it is in other disciplines, through research and publications in various parts of the world. In the last few years, I have been experimenting to some extent with my material, revising my notes, and attempting, on a modest scale, to introduce several different approaches. Whatever organizational structure the instructor selects for the course, it is important that it should have unity and, in Rosen's words (9), should deal "with a continuum of events in time, extending from the past through the present into the future . . . . This sense of continuity of human actions in time, this awareness that one cannot advance intelligently into the future without a willingness to look attentively at the past and appreciate its significance, is what is meant by the historical approach."

My treatment of the basic history course has thus far been based partly on the Kremers-Urdang approach, and partly on selected topics and recurring historical themes. Much can be done to stimulate interest in the course by showing interrelationships with other fields such as literature, the social, physical and biological sciences, and medicine. For example, a brief reading of selected passages from Christopher Marlowe's *Dr. Faustus* will certainly add interest to a discussion of Paracelsus' work; similarly, reading selections from Molière's *Le Malade Imaginaire,* or *Monsieur de Pourceaugnac,* will offer an important insight into the social status of the seventeenth century French apothecary. If, as Professor Cowen of Rutgers has stated (10), the teacher wishes "to illuminate the Puritan Revolt in England in mid-seventeenth century, and to underscore the fury and hatred that the Civil War engendered, he can refer his student to Nicholas Culpeper's translations of the *London Pharmacopoeia;* there he will find the 'spleen of a Roundhead' splattered throughout the work." Other suggestions along these lines have been made by Osborne (11). It should not be forgotten that the teacher of pharmaceutical history also has available for his students original classic papers by great pharmacists in English translations, e.g., those of Scheele, Döbereiner, Proust, and others.

CONCLUSION

What the future of history in pharmaceutical education will be in the extended curricula will depend on the attitude of school administrations. More than perfunctory recognition of the value of pharmaceutical history is needed to derive tangible and lasting benefits. Certainly, teachers of these subjects should be given adequate support and encouragement, but the teachers in turn must have the necessary competence and enthusiasm to justify such support. At this juncture, history of pharmacy, a relatively young and potentially vigorous discipline, presents a golden opportunity to bridge the gap between narrow specialization and the humanities and to give us a greater insight into some of the most pressing contemporary socio-economic problems of pharmacy. As such, it has much to offer the educated pharmacist of the future.

REFERENCES

(1) Sonnedecker, Glenn, "Proceedings Teachers' Seminar on Pharmacy" (K. L. Kaufman, Editor), American Association of Colleges of Pharmacy, Chicago, Illinois, 1955, pp. 68-75.
(2) Rosen, George, "On the Utility of Medical History" (Iago Galdston, Editor), Monograph I, Institute on Social and Historical Medicine, The New York Academy of Medicine, New York, N. Y., 1957, pp. 11-34.
(3) Sonnedecker, Glenn and George Urdang, *Am. J. Pharm. Ed.*, 16, 11 (1952).
(4) Sarton, George, "A Guide to the History of Science." Chronica Botanica Co., Waltham, Massachusetts, 1952, p. 257.
(5) Sonnedecker, Glenn and George Urdang, *op. cit.*, p. 21.
(6) Ackerknecht, Erwin, "On the Utility of Medical History" (Iago Galdston, Editor), Monograph I, Institute on Social and Historical Medicine, The New York Academy of Medicine, New York, N. Y., 1957, pp. 41-49.
(7) Blauch, Lloyd E. and George L. Webster, "The Pharmaceutical Curriculum," American Council on Education, Washington, D.C., 1952, p. 163.
(8) *Am. J. Pharm. Ed.*, 23, 143-161 (1959).
(9) Rosen, George, *op. cit.*, p. 12.
(10) Cowen, David L., *Am. J. Pharm. Ed.*, 22, 70 (1958).
(11) Osborne, George E., *ibid.*, 23, 78 (1959).

A COURSE IN BIOLOGICAL PRODUCTS

LOUIS GERSHENFELD

The report "Basic Material for a Pharmaceutical Curriculum," presented in 1927, included a consideration of discourses in bacteriology and immunology. The recommendation was that the course in bacteriology should be of such a nature as to enable the pharmacist to "effectively sell biologicals." On pages 118, 119, and 120 of this report, there is included an outline and classification of biological products dispensed by the pharmacist. When the four year course was established, the term "bacteriology" was replaced by the term "microbiology." Prior to 1930, in many if not in most colleges of pharmacy, bacteriological data were included in the course of materia medica or materia medica and therapeutics. Later, and even at present, information concerning biological products was and is presented in the course content of bacteriology or microbiology. Whatever the name of the department, the content in the latter course usually consists of material not only in bacteriology, but also in mycology, virology, rickettsiology, and frequently even in protozoology and helminthology.

The term "microbiology" is all-inclusive. However, inasmuch as data and techniques concerning bacteria have been and still continue to be our greatest source of material for presentation in courses in microbiology, the term "bacteriology" has been and continues to be used for such a course of instruction. The two terms, "microbiology" and "bacteriology," are therefore employed interchangeably or synonymously. In the *Pharmaceutical Curriculum,* published in 1952, microbiology is listed as Part III under the biological sciences. It was my privilege to serve as one of the five members of the Consultative Committee, which assisted in the preparation of this section. On page 118 of this report, the following is found: "Microbiology, as used in this report, is the study of microorganisms, including bacteria, molds, rickettsiae, viruses, and protozoa, as well as metazoa of medical importance. It is synonymous with bacteriology as that term is frequently used in schools of medicine." Biological products include preparations prepared from members of all groups mentioned above and not merely from those of bacterial origin.

Presentations during the last decade concerning the scope of a course in microbiology for pharmacy students usually recommend that attention should be given to a study of immunology, immunizing agents, allergens, and related products. Specific details as to the exact content and time to be allotted are usually not given. On page 120 of the 1952 *Pharmaceutical Curriculum,* the statement is made that "emphasis should be placed on aspects of particular interest to pharmacists." Among them are included: "immunology and immunizing agents and allergens." Additional "items that may be included are the manufacture and control of biological products." On page 119, statements are made that the pharmacy student should acquire "(4) knowledge of the basic principles of immunology including allergy; and (5) elementary understanding of methods used in the production, standardization, evaluation, and sterility control of biological products."

In the current interest in and extensive experimentation with vaccines for the prevention and modification or alleviation of symptoms of poliomyelitis, the

common cold, influenza, measles, the encephalitides, and other virus diseases, the practical importance of biological products and their application and use become even more apparent. There exists an extremely broad field for the practical application of biological products here and also in veterinary practice. The writer for many decades has indicated in published data and elsewhere and continues to hold the opinion that biological products will always be useful as prophylactic and diagnostic agents. Their value in the treatment, modification or alleviation of symptoms of disease is problematical. There will be as there have been periods during which time a specific biological product will be found of value as a therapeutic agent for a particular disease in humans. Such was the case when the antimicrobial serums were employed at one time for pneumococcus and meningococcus infections. However, antibiotics and other chemotherapeutic agents have proven to be more effective and less costly for the latter. On the other hand, the use of biologicals in a course of one to three injections for active immunization against certain diseases, with booster doses properly spaced and protection lasting for long periods of time, are more assured procedures of prophylaxis, generally less costly, and such a course is a more convenient method of administration than the use of antibiotics and other chemicals.

Discourses in biological products must consist of a presentation of basic and useful, full-scale, scientific data with a pharmacist's perspective, and with the understanding that these topics must serve him during his lifetime in a professional career. In the manufacture and use of biological products, all of the confirmable data and complex theories acquired in the study of microbiology, immunology, public health, and allied subjects are brought together to find some practical application in the health sciences for the benefit of mankind.

In a paper, "The Importance of a Knowledge of Microbiology to the Retail Pharmacist," presented before the Section of Teachers of the Biological Sciences at the 1954 meeting of the AACP, Hammarlund noted the importance of biological products to the retail pharmacist. Some information and studies concerning microorganisms are especially pertinent before the subject matter in a course in biological products is presented. Therefore, the exact period of time or school year chosen for such instruction will depend upon when the student had received the important principles and basic understanding in the course in microbiology including other basic scientific background. Generally, it would appear that such data are best given in the last year or during the one before the last year of the usual approved pharmacy course.

Shall lectures concerning biological products be interwoven with presentations as given in the regular or general course in microbiology or as part of other established courses in the pharmacy curriculum? The writer feels that discourses so interwoven would not serve the maximum good as compared to their presentation in a separate course. Unfortunately, the pharmacist in many if not in most cases has not placed himself in a position to properly distribute and dispense biologicals and serve the medical profession as capably as he does when dispensing other medicaments. We must recognize that the average physician knows less concerning biologicals than he does of other medicinal products. He too has received comparatively little information concerning them in his medical training. The knowledge imparted generally has been given in most instances in the early years of his course in medicine; and frequently the material was presented in different branches of scientific study in the medical curriculum.

In designating the course, one might consider the name "Immunology and

Biological Products" if "Biological Products" by itself appears to be inadequate. But, why is the name "Biological Products" to be given to such a course of instruction?

On page 814 of *USP XVI* under "Biologics," the following is found in the first paragraph: "The antitoxins, antivenins, blood derivatives, immune serums, immunologic diagnostic aids, toxoids, vaccines, and related articles that are produced under license in accordance with the terms of the federal Public Health Service Act of 1944, as amended, have been long known as "biologics." However, in Title III, Part F, of the Act, the term "biological products" is applied to the group of licensed products as a whole. For pharmacopeial purposes, the term "biologics" refers to those products that must be licensed under the Act and comply with Public Health Service Regulations—Part 73, pertaining to federal control of these products, as administered by the Division of Biologics Standards of the National Institutes of Health." The terms biologic products, biologicals or biologics, as defined in the Public Service Act of 1944 "means any virus, therapeutic serum, toxin, antitoxin or analogous product applicable to the prevention, treatment or cure of diseases or injuries in man." The terms virus, therapeutic serum, toxin, antitoxin, and analogous product are further defined to indicate their specific origin and exact meaning. However, it has been customary to restrict the term "biological product" to a rather special group of products. The preparations in this group supply specific antibodies (passive immunity) or are capable of eliciting an immune response (active immunity) and are of value in the diagnosis, prophylaxis, or treatment of diseases. In other words, under the above Act, a biological product either contains antibodies or is capable of causing the production of antibodies. It is for this reason that yeast, cultures of *Lactobacillus acidophilus*, and of *Lactobacillus bulgaricus* and similar cultures of bacteria (nonpathogenic, nonantigentic) are not regulated by this Act. In like manner, though in the fullest generic sense, antibiotics, hormones, heparin, enzymes, and others are derived from biological sources, they do not meet the definition as given in the above Act. Supervision of antibiotics and the others mentioned is under the control of the FDA and not the NIH. The foregoing information is presented inasmuch as a question frequently asked is whether a consideration of antibiotics might not best be included in a course in biologicals. If the course in biological products is to extend over a period of more than one hour for one semester, then one could include such additional related subjects as antibiotics, sterility testing (*USP* and *NIH* methods), testing for pyrogens, and other closely allied data. This comprises No. 15 (Miscellaneous) given below.

A more detailed outline of the subject matter to include in a course in biological products follows.

COURSE OUTLINE IN BIOLOGICAL PRODUCTS

At least one hour of didactic instruction per week for at least one semester. Credit, one semester hour. Required of senior (?) students in pharmacy. Among the subjects to be considered are:

1. **General Considerations.** Definitions; federal control; Vaccine-Serum Act of July 1, 1902 and the Revision-Public Health Service Act of 1944 (Section 351), relating to the control of biologic products in interstate shipment; intrastate and local laws and regulations where applicable; licensing, labeling, and

dating; preservation and storage; potency and identity tests; NIH, international and other standards; expiration date; tests for sterility, purity, and safety; preservation and marketing in the dry state; sanitary standards for manufactuing; permanent records and other regulations; immunization programs—when to immunize (infancy, preschool and school periods, adolescence); compulsory legislation or voluntary approach in fostering immunization practices; keeping records; immunization information for foreign travel; routes of administration—parenteral (SC—IC or ID—IM—IV—IS or IT) vs. oral and intranasal administrations; usual dosage and follow-up (booster doses).

2. **Immunity and Biological Products.** Antigens and antibodies, their nature and role; defensive factors of the animal body; humoral, cellular, natural and acquired immunity; active and passive immunity, and duration of; the properdin system and immunity; hypersensitivity and its relationship to immunity; reactions after administration; anaphylaxis, serum sickness, allergy, atopy, etc.

3. **Antibodies Employed as Prophylactic and Therapeutic Agents.** Separation and purification of antibodies; antitoxins: diphtheria, tetanus, botulinus, gas gangrene, scarlet fever streptococcus, and other marketed antitoxins; details concerning their manufacture, standardization, preservation, testing for potency, how and when used, and efficacy; equine, bovine, and other origins.

4. **Antivenins.** Antivenins for poisonous snakes, spiders, scorpions, etc. are considered as given under antitoxins; snake bites in the Americas. Also the use of venoms (bee, cobra, russell viper) as therapeutic agents is detailed.

5. **Antibacterial, Rickettsial and Antiviral Serums (Therapeutic Immune Serums).** Those which are available either as diagnostic agents or for use in the treatment or prevention of disease are mentioned; both human (convalescent serums) and animal (equine, bovine, rabbit, etc.) preparations are considered.

6. **Human Blood, Blood Fractions and Blood Derivatives.** Preparations considered are: Citrated Whole Human Blood; Citrated Normal Human Plasma; Normal Human Serum; Normal Human Serum Albumin; Plasma Protein Fraction; Antihemophilic Globulin; Antihemophilic Plasma; Thrombin; Thromboplastin; Blood Cells, Human; Immune Serum Globulin; Fibrinolysin; Profibrinolysin; Fibrinogen; Radio-Iodinated (I^{131}) Serum Albumin; Blood-group Specific Substances A and B; Anti-A and Anti-B Blood Grouping Serums; Anti-Rh Typing Serums; etc.

7. **Antigens Used as Therapeutic and Immunizing Agents.** Bacterial vaccines; virus vaccines and rickettsial vaccines; stock and autogenous vaccines; simple and mixed, monovalent and polyvalent vaccines (or antigens); purified antigens; adsorbed vaccines and toxoids (alum, aluminum hydroxide and phosphate absorbed); sensitized vaccines; lipovaccines and the use of adjuvants; toxins and toxoids; bacterial culture filtrates; modified bacterial antigens; BCG and vole bacillus vaccines; tuberculins; multiple (mixed or combined) antigen preparations.

8. **Manufacture, Standardization, and Preservation.** Complete details are given as to manufacture, standardization, preservation, how and when used and efficacy of the following: Typhoid Vaccine; Paratyphoid A and B Vaccines; Pertussis Vaccine; Plague Vaccine; Cholera Vaccine; Diphtheria Toxoids; Tetanus Toxoids; Scarlet Fever Streptococcus Toxin; Diagnostic Diphtheria

Toxin; Old Tuberculin (OT); Purified Protein Derivative of Tuberculin (PPD); Brucellergen; Mallein; etc. Details will be given concerning adsorbed products and multiple antigen preparations.

9. **Polysaccharides and Other Microbial Preparations and Products Used as Antigens.** Specific and nonspecific protein therapy. Bacterial enzymes as streptokinase-streptodornase, and bacteriophage and phagotherapy.

10. **Virus and Rickettsial Vaccines.** Live (attenuated) versus dead vaccines; heat-killed or the use of bactericides or irradiation; details will be given (as above) concerning: smallpox, poliomyelitis, yellow fever, rabies, typhus, rocky mountain spotted fever vaccines, and others. Origin—animal, chick embryo (avian), tissue culture.

11. **Allergens and Allergenic Extracts.** Pollen and other protein (animal, bacterial, food, plant, and miscellaneous) extracts and their preparation, standardization, preservation, and use will be considered. Theory of desensitization; inhalant allergens; use of emulsified extracts; fungus antigens; poison ivy and poison oak extracts; trichinella extract.

12. **Diagnostic Aids and Skin Testing.** The biological tests employed as aids in diagnosis will be considered with special emphasis on their significance and on the preparations and use of the agents employed in such testing. Among those mentioned are: the Schick, Dick, Reh, Moloney, Schultz-Charlton Blanching, Ito-Reenstierna, Mallein, Frei, Mantoux, Von Pirquet, Moro, Calmette's Ophthalmic Conjunctival Reaction, Bang, Mitsuda (Lepromin) Reaction, and other tests. Allergic skin testing will also be considered.

13. **Diagnostic Preparations for Laboratory Use.** Under 9, 11 and 12 are included diagnostic products employed directly by the attending physician as clinical aids.

A much larger group of diagnostic biological preparations are marketed for use as aids primarily in the laboratory. Among the latter are: various antiserums for the identification and typing of specific bacteria, rickettsia, and viruses; and various antigens for the serological diagnosis of bacterial, rickettsial, and viral diseases; reagents used for determining the anti-streptolysin "O" level in streptococcal infections; anti-human (and other specific animal) precipitin serums in the medicologal testing for blood.

Others are: standardized heterophile reagents for the differential diagnosis of infectious mononucleosis; thromboplastin and related accurately-prepared interstandardized reagents used for prothrombin determinations; and influenza virus hemagglutinating antigen and anti-influenza virus serum for the hemagglutination inhibition test.

A consideration of the above products may or may not be included. In practice, most of them are prepared by or supplied directly to clinical laboratories. With very few exceptions, such products are not licensed by the NIH. The practicing pharmacist usually does not handle such preparations. Perhaps some generalities concerning them might be presented. Detailed data are to be considered only in special instances.

14. **Biologicals in Veterinary Practice.** Vaccines (bacterial and virus), aggressins, antiserums, antitoxins, toxoids, tuberculins, mallein, and other biological products are available for use in veterinary practice. The preparation, administration, and effectiveness of many of them are similar to identical products employed for humans. Others, however, are prepared and employed

for the prevention and treatment of diseases which are observed only in veterinary practice; and details concerning these products, which are of distinct value, may be considered.

The control of biological products for veterinary use in interstate shipment is not under the supervision of the NIH. Licenses, however, formerly issued by the Bureau of Animal Industry (BAI) of the U.S. Department of Agriculture are required. They are now issued by the Animal Inspection and Quarantine Division of the Agricultural Research Division (ARD) of the U.S. Department of Agriculture. The Biological Products Licensing Section in this Division operates under the Virus-Serum-Toxin Act of March 4, 1913, which concerns itself with veterinary biologicals.

A detailed consideration of veterinary biologicals may be useful for presentation in certain areas. Whether detailed data or only generalities are considered may depend upon the time period allotted to the entire course.

15. **Miscellaneous.** Depending upon the time allotted, herein may be included related data. See above.

REFERENCES

(1) Blauch, Lloyd E. and George L. Webster, "The Pharmaceutical Curriculum," American Council on Education, Washington, D.C., 1952, pp. 118-122.

(2) Charters, W. W., A. B. Lemon, and Leon M. Monell, "Basic Material for a Pharmaceutical Curriculum." McGraw-Hill Book Co., N. Y., 1927, pp. 118-120.

(3) Elliott, Edward C., "The General Report of the Pharmaceutical Survey," American Council on Education, Washington, D.C., 1952.

(4) Gershenfeld, Louis, "Biological Products," Romaine Pierson Publishers, New York, N. Y., 1939.

(5) Gershenfeld, Louis, *Am. J. Pharm. Ed.*, 19, 74 (1955).

(6) Hammarlund, E. Roy, *ibid.*, 18, 453 (1954).

(7) Public Health Service Act of July 1, 1944. Title III, Part F of this Act relates directly to the control of "biological products" for human use. Public Health Service Regulations—Part 73 includes published amendments, U.S. Public Health Service, Washington, D.C.

(8) Virus-Serum-Toxin Act of March 4, 1913 concerns itself with biologic products for veterinary use, Agricultural Research Service, U.S. Department of Agriculture, Washington, D.C.

. . . time is a relentless master of ceremonies.

Edward C. Elliott, Am. J. Pharm. Ed., 13, 253 (1949)

HUMAN ANATOMY IN THE PHARMACY CURRICULUM

RUSSELL D. COLEMAN

INTRODUCTION

Relatively little information is available concerning courses in human anatomy for pharmacy students. Blauch and Webster (1) have stated that knowledge of the morphology of organs and tissues is prerequisite to an understanding of function and to comprehension of the mode of action of drugs, and suggested that a study of the gross and microscopic anatomy of selected vertebrates should be a basic requirement or prerequisite in the pharmacy curriculum. Nevertheless, Deno (2) in 1953 reported that only a small number of schools of pharmacy required a course in mammalian anatomy.

A survey of the most recent announcements from sixty-three schools of pharmacy in the United States and Canada indicates that a program in gross and microscopic anatomy including dissection and microscopic examination of human tissues and organs is offered in but one of the schools of pharmacy. Five schools offer lecture material only, and one school offers human anatomy by means of prepared demonstration specimens. Instruction in mammalian anatomy is presented in the physiology, biology, and/or zoology course at a number of other schools (3).

The purpose of this report is to present the objectives, content, method of presentation, and student evaluation procedures employed in presenting anatomy to pharmacy students at the University of California. This documentation may serve to assist the planning of those in other schools of pharmacy who may consider a course in human anatomy as essential for their students.

It should be noted that a formal course in human anatomy has been an integral part of the curriculum of the School of Pharmacy at the University of California at San Francisco since 1938, at which time this subject was introduced in order to provide a more realistic and basic background to later study of the action of drugs on organs and tissues. The course in human anatomy was taught initially by different groups of instructors. It should be emphasized, however, that instruction in anatomy was introduced much earlier in the history of the School, being taught informally in the course in physiology. Latterly, teaching and staffing has been increasingly related to the expanded and newly housed Department of Anatomy of the School of Medicine which has recently moved to this campus. Proximity to the School of Medicine, its laboratories, and staff has immeasurably increased the resources available for teaching in this area.

SPECIAL REQUIREMENTS OF THE PHARMACY CURRICULUM AT THE UNIVERSITY OF CALIFORNIA

The School of Pharmacy offers a program leading to the degree Doctor of Pharmacy (Pharm.D.). The program consists of two preprofessional years and four years of professional study, the latter taken on this campus. The preprofessional curriculum includes, for the purpose of providing background in biology, course requirements in general botany (three to five units), and general zoology (eight units), each with laboratory. The School of Pharmacy no longer offers a curriculum leading to the degree of Bachelor of Science in Pharmacy.

OBJECTIVES OF THE COURSE IN ANATOMY FOR PHARMACY STUDENTS

The following objectives are entertained for the course in human anatomy for pharmacy students at the University of California:

1. To provide the student with an opportunity to acquaint himself with the gross and microscopic morphology, organization, and function of the organs and tissues of the human body.
2. To provide the student with an opportunity to acquaint himself with and to use anatomical terminology relating to the normal structure and function of the human body.
3. To provide a morphological basis for the biological synthesis that the student should develop through his study of physiology, biochemistry, pathology, pharmacology, and toxicology.
4. To provide the student with an educational experience which will enable him to think and reason soundly when confronted with biological problems relating to the human body.

University of California pharmacy students receive four units of credit on satisfactory completion of the course in anatomy. The course is offered in the second semester of the freshman year and consists of two hours of lecture and six hours of laboratory instruction per week for fifteen weeks. The lectures and laboratory periods are equally divided between macroscopic (gross and neuro-anatomy) and microscopic anatomy.

ORGANIZATION AND COURSE CONTENT FOR GROSS AND NEURO-ANATOMY

The freshman class in the School of Pharmacy consists of approximately eighty students. Ten human cadavers are made available to the class. Each student is provided with a laboratory manual of dissection procedure prepared specifically for pharmacy students by the staff. The selection of areas of the human body of greatest significance was determined primarily by biological significance and secondarily on the basis of applicability to subsequent courses in the pharmacy curriculum: namely, physiology, pathology, biochemistry, and pharmacology. Study of the thoracic and abdominal cavities, their viscera, and of the central and autonomic nervous system is deemed to be paramount in importance in the time available. Addendum A provides an outline of the topics covered. It should be noted that the coverage of the morphology of the special senses and of the extremities is limited in this course. Time does not permit detailed instruction relating to the eye, ear, and nose; and these organs are covered in the subsequent course in physiology.

The class is divided into two equal sections and each section is assigned a separate laboratory period. The first section dissects during one laboratory period and the other section during a second period; no more than three or four students work at each dissection table during any one laboratory session. Each group of three or four students is responsible for the dissection of either right or left half of the cadaver. When the dissection involves the thorax and abdominal viscera, each group of three or four students reviews the dissection performed by the previous group and proceeds further with the dissection. This combined effort by groups of three or four students in each of the two sections of the class permits a more rapid coverage of the anatomy dissection. This type of approach depends on the availability of an adequate staff, but permits more individual instruction.

The lectures are presented by regions and where possible are correlated with the dissection assignment for each laboratory period. Functional significance of organs and tissues is emphasized during the lectures and dissection periods.

ORGANIZATION AND COURSE CONTENT FOR MICROSCOPIC ANATOMY

The entire class meets for each lecture and laboratory period. In the laboratory each student is provided with a microscope; each pair of students shares a loan collection of prepared tissue sections of human and animal tissues and organs. A special feature of the lecture presentation is access to and use of an extensive collection of projection slides in color. A large collection of special microscope demonstration slides is available to show features not easily displayed in the boxes of routine loan slides. An area of increasing emphasis in teaching is the correlation of cell structure, as displayed by the electron microscope, with disturbed function of whatever origin.

The lectures are correlated with each laboratory assignment. Addendum B shows the subject matter presented in microscopic anatomy.

EVALUATION OF STUDENT ACHIEVEMENT IN ANATOMY

Various appraisal methods are employed by the Department of Anatomy to measure the student's understanding of the learning objectives and to enable him to appraise his own progress. The more reliable and valid the appraisal methods, the more likely the student is to assume responsibility for his learning of anatomy and to pursue it fruitfully.

The laboratory practical examination in both gross and microscopic anatomy has been found to be a successful appraisal method in the Department of Anatomy. The identification of labelled gross and microscopic anatomic structures measures the ability of the student to observe structures, correlate his observations, and draw conclusions. Furthermore, it permits a broad sampling of the student's knowledge and lends itself to the appraisal of correlative learning. The well-planned laboratory practical examination seems to provide a reliable and valid measure of the student's knowledge of human microscopic and gross anatomy.

CONCLUSION

The pharmacist has traditionally been concerned with the preparation, compounding and dispensing of drugs. During the last decade, a tremendous number of new pharmaceutical preparations have been produced which severely burden the clinician's capacity to keep abreast of their useful and harmful properties. The pharmacist is in a unique position to serve the allied health professions in a consultative capacity on the pharmacologic and toxicologic effects of these new preparations. To fulfill this responsibility, it is considered essential that the pharmacist be familiar with the sites of drug action and with the structure and function of organs, tissues, and cells which exhibit a selective response to them.

The current rapid increases in knowledge require a shifting of emphasis. The significance of ionizing radiation on cells has taken on increased importance in recent years. Lymphocytes and granulocytes, for example, are particularly sensitive to radiation. Because of their susceptibility to destruction by radiation, the pharmacist should be aware of the body's reduced antibody formation and decreased protection to invasion by microorganisms. Likewise, germinal cells of the ovaries and testes are susceptible to radiation damage. The development

and use of drugs offering radiation protection to vital and sensitive cells of the body will assume increased significance in the ensuing years. It is believed that instruction in the general principles of gross and miscroscopic human anatomy will assist the pharmacist to comprehend the functions of organs, tissues and cells, including the sites of absorption, routes of distribution, action, fate, and excretion of drugs.

ACKNOWLEDGMENT

The author acknowledges with gratitude the assistance and advice in the preparation of this manuscript by Troy C. Daniels, Dean, School of Pharmacy and William O. Reinhardt, Chairman, Department of Anatomy, University of California at San Francisco.

ADDENDUM A

Lecture Topics for Gross and Neuro-Anatomy

I Thorax

1. A. Orientation
   B. Osteology of thorax
   C. Pectoral region, breast
2. A. Thoracic wall; structure and function of a typical spinal nerve
   B. Pleural cavities
   C. Lungs, trachea and bronchi
3. A. Boundaries of the mediastinum
   B. Pericardial cavity and heart
   C. Coronary circulation
   D. Conduction system
   E. Cardiac nerve supply
4. A. Boundaries and contents of the posterior mediastinum

II Abdomen

5. A. Abdominal wall
   B. Herniation
6. A. Peritoneum and its reflections
   B. Development of the gastrointestinal tract and its peritoneal fold
   C. Blood supply to the stomach
7. A. Blood supply to the gastrointestinal tract
   B. Hepatic portal system
   C. Liver and spleen
8. A. Kidney and ureter
   B. Suprarenal glands
   C. Pancreas
   D. Autonomic nerves and collateral ganglia

III Nervous System

9. A. The scalp
   B. Meninges
   C. Dural venous sinuses
10. A. Arterial supply to the brain and spinal cord
    B. Divisions of the brain
    C. Cranial nerves
    D. Brain stem
    E. Gyri and sulci of the cerebrum

11. A. Spinal cord
    B. The synapse
    C. Pathways of pain and temperature, touch, proprioception
12. Autonomic nervous system:
    A. Sympathetic components
13. Autonomic nervous system:
    A. Parasympathetic components

ADDENDUM B

Lecture Topics for Microscopic Anatomy

1. The cell
2. Epithelium
3. Blood and lymph
4. Connective tissues:
    A. Embryonic
    B. Areolar
    C. Dense fibrous
    D. Elastic
    E. Reticular
    F. Adipose
5. Cartilage and bone
6. Muscle tissue
7. Nerve tissue
8. Circulatory system
9. Lymphoid organs:
    A. Lymph glands
    B. Spleen
    C. Thymus
10. Integument and derivatives
11. Digestive tract:
    A. Esophagus
    B. Stomach
    C. Duodenum
    D. Jejunum
    E. Ileum
    F. Appendix
    G. Large bowel
    H. Rectum
12. Glands associated with digestive tract:
    A. Salivary glands
    B. Pancreas
    C. Liver and gallbladder
13. Respiratory system:
    A. Trachea
    B. Bronchi
    C. Bronchioles
    D. Respiratory bronchioles
    E. Alveoli
14. Urinary system:
    A. Kidney
    B. Ureter
    C. Urinary bladder

REFERENCES

(1) Blauch, L. E. and G. L. Webster, "The Pharmaceutical Curriculum," American Council on Education, Washington, D.C., 1952.
(2) Deno, R. A., *Am. J. Pharm. Ed.*, 17, 401 (1953).
(3) Voss, E., *ibid.*, p. 204.

Happy will be the day when we grant no credit for work done in other colleges toward a professional degree. Medicine learned that lesson a long time ago.

Rufus A. Lyman, Am. J. Pharm. Ed., 13, 189 (1949)

A COURSE IN GENERAL PATHOLOGY FOR STUDENTS OF PHARMACY

JOHN S. WELLINGTON

As part of the curriculum leading to the degree of Doctor of Pharmacy (Pharm.D.), students at the University of California School of Pharmacy are required to take a four-unit course in general pathology in the first semester of their third year. This sixteen-week course, with two hours of lecture, three hours of laboratory, and two hours of seminar per week, is designed to present the fundamental principles of pathologic (morphologic) and physiologic changes incident to abnormal states.

To accomplish this end, stress is placed on the mechanisms whereby the human organism can respond to injury. An effort is made to keep these concepts on as broad a basis as possible, and similarities of the host response to varying modes of injury are stressed.

The aim of the course, then, is to provide a framework or concept of the cellular and humoral responses to injury onto which the student can fit his later encounters with disease patterns and mechanisms.

For the pharmacy student, a background in general pathology can provide a basis for better understanding in later courses dealing with the effects of therapeutic compounds; for example, steroids and antibiotics on biological processes. It is recognized that judicious use of clinical information, with correlation of underlying functional and morphologic changes with the signs and symptoms and overt manifestations of disease in the human patient, can be of great value in teaching. The drama of medicine is an effective attention-getter, and it is for this reason that examples are drawn from clinical material to illustrate basic points. However, these basic points, these basic mechanisms by which the human organism responds to injury, are the core of the subject matter which is taught.

The material taken up in the laboratory and seminar sessions follows the outline of the series of lectures, as shown in Table I. The lectures cover the general principles of these subjects, using examples of human disease to illustrate and elaborate the principles presented. Additional reading in the form of textbook assignments is required, and each lecture is concluded with the projection and demonstration by the instructor of photomicrographs of the microscopic slides which will be taken up later in the corresponding laboratory periods.

The seminar is taken up by further projection of photomicrographs and photographs of gross material showing the structural changes in diseased organs visible by the naked eye. There is two-way questioning between the instructor and the class, aiming toward correlating the morphologic changes seen with the material that has been covered in the lectures.

The laboratory sessions are devoted to demonstrations of fixed gross pathologic material to the whole class and to study on the part of the student of selected examples from his loan-collection of 200 microscopic slides. These slides have been prepared from diseased human tissue, and are chosen to provide examples of the morphologic changes occurring at various times during the

TABLE I. Outline for a Course in General Pathology for Students of Pharmacy

Title of Lectures	Subjects Covered	No. of Lecture Hrs.
Degenerative processes	Atrophy, types of degeneration, necrosis, infiltrations, calcifications	2
Inflammation	Macroscopical and microscopical observations, phagocytosis, cellular response, abscess formation, causes, types	3
Immunity and allergy	Natural and acquired immunity, antigens and antibodies, types of hypersensitivity	3
Healing and repair	Healing of soft tissue and bone; primary and secondary processes; regeneration; abnormalities in healing	2
Hypertrophy, hyperplasia and neoplasia	Increased growth vs. new growth, etiological factors, invasion, metastasis	4
Hemostasis, thrombosis and infarction	Mechanisms of hemostasis; abnormal clotting, embolism, infarction	2
Granulomatous inflammation	Proliferative inflammatory reactions caused by foreign bodies, tuberculosis, fungi, etc.	2
Disease due to bacteria, viruses, and parasites	Characteristics of invading organisms. Host responses	4
Diseases of metabolism and nutrition	Pathological changes in protein and vitamin deficiencies	2
Endocrine disorders	Changes in endocrine deficiencies or excesses	1
Diseases due to physical and chemical agents	Burns, electrical injuries, toxic substances	1
Disturbances of body fluids, edema	Water and electrolyte disorders, mechanisms of edema	1

course of representative diseases. One instructor is available for every fifteen or twenty students to help point out the particular features of abnormal morphology to be seen in these slides.

Prerequisites for the course are: Gross and microscopic anatomy, general physiology, and biochemistry. In addition, the students have taken a course in microbiology in the year preceding this course.

There are three main areas where this course may be of value to pharmacy students:

1. The course serves as an introduction to the use of morphologic changes as a research tool for the student who will choose to do experimental pharmacy.
2. In combination with a specific course given in the senior year, this course serves in part as an orientation in medicine.
3. A knowledge of the basic patterns of reaction to injury is fundamental to a good understanding of the problems to be faced in any of the health sciences.

There are two areas in which consideration is being given to a change in teaching of this course. The first of these is the introduction of experimental pathology into the laboratory period, with groups of four to five students performing some of the simple classical experiments in the study of inflammation, in the production of neoplasms, etc. The second is a greater utilization of autopsy material with small groups of students attending concentrated demonstrations (perhaps filmed or televised) of the clinical, gross, and microscopic findings in individual autopsies with correlation of the clinical manifestations with the underlying morphologic and functional disorders.

The inclusion of this course in the curriculum for pharmacy students is predicated on the idea that a knowledge and appreciation of the basic changes, both morphological and functional, taking place in human disease processes is fundamental to understanding and intelligent application of any of the health sciences.

. . . teacher's equipment is what, for want of a better term, we call personality, an elusive element that defies definition, the combination of high-mindedness, quickness of mind, sympathy with people, altruism in personal relations, enthusiasm for one's task, high standards of achievement, power of vivid presentation and the gift of common sense—all of these and many other desirable personal traits.

Lloyd E. Blauch, Am. J. Pharm. Ed., 13, 461 (1949)

CONCEPTS OF DRUG EVALUATION IN THE DISPENSING COURSE OF THE FUTURE

JOHN AUTIAN AND ALEX BERMAN

INTRODUCTION

Changing Patterns of Pharmacy Practice. More than one hundred years ago, Procter (1) sensed with uneasiness the tremendous impact that the pharmaceutical industry would have on the practitioner of pharmacy. "Pharmacy," he stated, "may be defined to be the art of preparing and dispensing medicines, and embodies the knowledge and skill necessary to carry them out in practice. But if the preparation of medicines is taken from the apothecary and he becomes merely the dispenser of them, his business is shorn of half its dignity and importance, and he relapses into a simple shopkeeper."

The rise of a dynamic pharmaceutical industry undreamed of by Procter and the rapid socio-economic and scientific changes of the last century have indeed markedly affected the nature of pharmacy practice. This is, of course, recognized by leaders of pharmacy, as can be seen from reading the recent report of the AACP-NABP Joint Committee to Redefine the Term "Pharmacy." (*Am. J. Pharm. Ed.*, 24, 64 (1960)). The inauguration of extended curricula in pharmaceutical education, the shift from galenical pharmacy to physical pharmacy, the revamping of pharmacognosy courses, all are significant steps in adapting to changing times.

But what of the present and future role of the community and hospital pharmacist in the modern drug distributive system? Is the pharmacist to become largely a dispenser of prefabricated medications now that his compounding and manipulative functions have been drastically curtailed? It has been repeatedly suggested that the pharmacist of the future should be a drug consultant to the physician, but the term "consultant" has not been adequately defined, nor have the nature and scope of consultation to be performed by him been clearly spelled out.

It would seem that if we accept the assumption that the main professional function of future practitioners of pharmacy will be an advisory one, then we must carefully define our objectives and consider how we are to educate such pharmacists.

The Doctor's Dilemma. Faced with a bewildering avalanche of new proprietary medication, the therapeutic claims for which he is unable to evaluate, the modern physician looks about him for help. At this juncture it is the pharmacist who should assume the task of advising and collaborating with the physician.

This crisis in therapeutics was underlined recently in a significant editorial by Don E. Francke (*Am. J. Hosp. Pharm.*, 17, 75 (Feb.) 1960) in which the views of Dr. Beckman, Editor of the *Year Book of Drug Therapy*, were cited. One of the most outspoken critics of unsupported claims in drug advertising, Dr. Beckman has stated (2) that "it is the advertising and sales management

officials who are seeking to take over the practicing methods of medical men and tell them what to do and how to do it . . ."

That this problem of evaluating proprietary medications is not restricted to the United States is evident from data available from other parts of the world. For example, the Hinchecliffe Report (3) on the cost of prescribing in Great Britain (*Final Report of the Committee on Cost of Prescribing,* Ministry of Health, London, 1959) points to the need for objective information about new drugs for the medical practitioner:

> Our witnesses agreed that it was wrong that the doctor should be dependent upon the manufacturers' advertisements for information about new drugs. Most felt that to help him in reaching a decision he needed to have easy access to some independent source of information.
>
> • • •
>
> The evidence we have suggests that general practitioners would welcome advice and information to enable them to put the manufacturers' claims in perspective.

The discovery and application of powerful therapeutic agents have been a boon when used with discrimination, but experienced clinicians and pharmacologists are only too aware of toxic side-reactions and potential dangers which their use entails. Witness for example the observations of a prominent dermatologist (4) on the widespread prescribing of the newer psychotherapeutic drugs:

> The introduction of a multiplicity of psychotherapeutic drugs and of new terms such as tranquilizer, ataraxic, normalizer, calmative, neurosedative, neuroleptic, psychic energizer, pacific, antiphobic and phrenotropic has created a difficult situation. Physicians are confronted with the problem of evaluating claims of usefulness for a wide variety of chemical substances with diverse pharmacological effects, which are proposed for the treatment of neurotic and psychic disorders. It appears probable that the gradually increasing number of new drugs, as well as new terms will add to rather than detract from the confusion.
>
> • • •
>
> There are few well-controlled studies on the use of the newer tranquilizing agents, and there is even scanty laboratory information about their pharmacologic properties. Since the cerebral cortex is relatively inaccessible, there are no accurate, useful screening methods for determining the actions of these drugs. Widespread use of these new drugs does not seem justified on the basis of the dearth of clinical reports.
>
> • • •
>
> Diagnosis of manifestations of reaction to psychotherapeutic drugs has become a problem which the dermatologist must solve—daily. During the past four years, I have encountered a number of diagnoses wherein I failed, or nearly failed, to recognize that a given dermatosis might be the result of untoward reaction to a tranquilizing drug.

Impact of Proprietary Medications on Pharmacy Practice. The problem discussed thus far affects not only American pharmacy, but is global in scope. It is significant that the report of the Retail Pharmacy Commission of the International Pharmaceutical Federation dealing with the influence of proprietary medications on the practice of pharmacy is scheduled to be debated at the 1960 General Assembly of the FIP in Copenhagen. The Commission's report ("The Development of Pharmaceutical Specialties and its Influence on the Practice of Pharmacy," *Journal Mondial de Pharmacie,* No. 1, 9-18 (1960)) reads in part as follows:

> The pharmacist must master the specialty if the specialty is not to master him. He must be *magister artis suae* . . . this means that he must have a general scientific knowledge sufficient to ensure that he knows what there is to be known about a specialty or at least knows where to lay his hands on the information. This does not mean that he must be familiar with all the technical details of manufacture. But he must know how it is made; the full significance of the formula declared on the label; its physiological activity and therapeutic use and its analogies with other medicaments that are its near neighbors. He must also of course know the commercial elements of the distribution of a specialty—its different forms . . . and the qualities and sizes of the commercial packages . . . this is of prime importance in his relation with physicians . . . An increasingly important role for the pharmacist is therefore to act as the adviser to the doctor in this field. To do this satisfactorily the pharmacist needs to have at his disposal a wide range of literature. His library must include the latest editions of reference books; he must study the current medical journals; he must have comprehensive information about specialities, catalogued for ready reference. To be able to do this he requires substantial help from his teachers in the university and from his professional societies.

The report mentions that 80 per cent of medications prescribed in France are specialty items, while in Canada and in the United States, the figure rises to about 90 per cent. That only 50 per cent of drugs prescribed in Great Britain are proprietary preparations is largely due to the fact that the *British National Formulary* is generally followed by physicians in writing prescriptions for non-proprietary medications under the National Health Service.

Image of the Future Pharmacist. What then should be the attributes of the future pharmacist in the context we have just described? He will have had at least five years' academic training, and as time goes on, the six year graduate with a professional doctorate in pharmacy will become more prevalent. This new pharmacist will presumably have had more background in such areas as pharmacology, the basic and medical sciences, and physical pharmacy. As adviser on drugs to physicians, dentists, nurses, veterinarians, and the general public, he must of necessity have had as broad a professional and liberal education as possible.

In what environment will the pharmacist of the future be most likely to make the optimum contribution? Certainly the dynamic field of hospital pharmacy offers superb opportunities, as does the professional prescription store. With the distribution of drugs in hospitals now approaching 30 per cent of the national total, it is not unreasonable to expect the volume of hospital drugs to rise to 50 per cent of the national figure in the foreseeable future. It is also reasonable to expect that the future pharmacist, especially the recipient of a doctorate in pharmacy, will gravitate toward professional prescription establishments.

Drug Evaluation by the Pharmacist. If we accept the premise that the ability to evaluate drugs will be the most important characteristic of the future pharmacist, then we must make sure that the pharmaceutical practitioner will be able to appraise the therapeutic claims of prescription and non-prescription specialties as well as their chemical and physical components.

For this, the pharmacist will need cooperation from industry, professional organizations, and schools of pharmacy. But the responsibilities for carrying out his role as consultant rest squarely on his shoulders. He must have a well-equipped library, a file for literature on new drugs, and ready access to sources of drug information.

It is in the dispensing course that the major emphasis can be focused on training future pharmacists to evaluate drugs.

The Course in Dispensing. With drug evaluation as the major objective of the dispensing course, the course content can be broken down into the following broad categories:

1. Communications and Sources of Information
2. Techniques in Compounding and Dispensing
3. Theory of Drug Activity
4. Drug Evaluation (Therapeutic)
   Drug Evaluation (Pharmaceutical Aspects)
5. Application of Drugs to Disease
6. Laboratory
7. Conference

CONTENT OF FUTURE DISPENSING COURSE

Communications and Sources of Information. One of the basic tools which the pharmacist should possess is an adequate knowledge of medical terminology. The etymological approach to medical terminology may be mastered in a relatively short time; perhaps six to ten hours of teaching and drill are all that are needed. A grasp of medical terminology will supplement the technical vocabulary gathered by the pharmacist in his courses in pharmacology, human physiology, pathology, and other related fields.

The ability to communicate on a high professional and scientific level with physicians is an essential qualification for his role as consultant and will be indispensable for purposes of interprofessional relations.

Closely linked with his ability to communicate with the physician is the ability of the pharmacist to acquire readily available sources of information. Rapid accessibility to impartial and reliable drug-information sources is a necessity for the consultant. At present, there are a number of valuable objective sources which contain assessments of new drugs from the point of view of therapeutic efficiency. The American Medical Association, the American Dental Association, and the American Society of Hospital Pharmacists all issue authorative information on new products. Textbooks are also appearing which treat concisely the merits of new drugs. Original articles in the medical journals must of necessity be referred to when a new medication appears on the market. With the background the student receives in his senior pharmacy course, he should be able to appraise the results reported in such articles and from this reach certain conclusions about the value of the new drug. Insufficient published evidence on a new product should alert the pharmacist not to recommend the product until he has contacted the medical representative to learn if further reports are available from other investigators in the field. At least one private consulting agency is now offering this service.

A more difficult situation—at least at present—is the scanty information on dosage forms. Although the manufacturers do supply a great deal of medical literature concerning their products, they do not usually include much information on the pharmaceutical aspects of the product. It is likely that in the future, the companies may have to supply experimental data on stability, proven advantages of their formulations, and other such information which will guide the pharmacist in recommending one product rather than another. Here again, through their laboratories, schools of pharmacy can serve as the unbiased source of evaluating the merits of a particular dosage form. If a firm is convinced

that its particular drug product has pharmaceutical advantages over other related products, it certainly should not hesitate to supply sufficient evidence or to permit an outside source to pass judgment.

Techniques in Compounding and Dispensing. The senior course in pharmacy must continue with fundamentals presently included in dispensing courses. Senior students in the six year program will presumably already have been exposed to various aspects of compounding and dispensing practices, and consequently this phase of the course may be materially reduced, although not eliminated. Perhaps the greatest value which can be gained by the student in this phase of the course is to understand the necessity for accuracy and precision in compounding. Realistic limits of errors, depending upon equipment, the quantity of material he prepares, the dosage form, and the specific drug, can be presented in a manner which is meaningful. This approach is certainly not new; Goldstein has reviewed this "error" problem in numerous publications. The pharmacist of the future must be aware of the theory of errors and statistical methods employed by industry to insure proper quality control of weights and measures of various dosage forms. We will most likely see even more revolutionary dosage forms appearing in the future, with the result that compounding of prescriptions will probably decrease even more than at present. However, this may not occur in hospitals where the pharmacy department has undertaken a more active role in supplying dosage forms of research drugs for clinical trials; such compounding then would be somewhat analogous to that seen in product development rather than in usual prescription compounding.

State and Federal laws concerned with drugs and poisons can be included in this section of the course, but only as they relate to compounding or dispensing practice. A formal jurisprudence course preceding the senior year would, indeed, be very helpful in teaching senior pharmacy.

Theory of Drug Activity. Even though various aspects of drug activity are included in several courses prior to the senior year, in many instances these concepts remain as isolated areas of facts which may or may not serve a useful purpose. Thus, the student in pharmaceutical chemistry is shown an array of relationships between a biological response and chemical structure of drugs, while in biochemistry he is exposed to theories on enzymatic activity and their relationship to cellular acceptance or rejection of foreign bodies including drugs. In pharmacology, general considerations of "how," "where" and at times "why" a drug acts in the body are presented. Bits of information on drug activity are also included in appropriate areas of courses in biology, physiology, and bacteriology.

The multiplicity of theories and the occasional divergence of viewpoints hamper the student in developing an organized and logical approach to understanding drug activity. This is no indictment of the content of the courses or of the pedagogy used in the disciplines referred to above, but rather points to the necessity for unifying concepts. Responsibility for collecting, organizing, and disseminating information must fall logically in the senior year, since only at this period of the student's training does he have sufficient scientific background to appreciate fully the relation of theory to actual clinical use of drugs. The inclusion of such advanced subject matter seems most logical in the terminal pharmacy course.

Before developing this specific area, the teacher must have a thorough knowledge of what has already been presented to the students in previous courses; thus, he can select and organize the drug theory lectures to include a review of pertinent theories and concepts already presented, keeping in mind the need to encourage the student to utilize from his other course work fundamental knowledge applicable to drug theories.

Since the student has already had much of the information on drug activity in one form or another, he may be assigned outside reading to supplement the lecture material. The latest information on drug activity can also be advantageously included in these presentations. These lectures will orient and prepare the student for a fuller appreciation and understanding of the rationale for drug therapy.

Evaluation of New Drugs (Therapeutic). Perhaps no higher prestige can be achieved by the practicing pharmacist of the future than to be accepted by other members of the health team as an advisor in all matters pertaining to therapeutic agents and their dosage forms. It will not be sufficient to have available only a file system of all marketed medications which can be referred to when a physician or other members of the health professions make an inquiry. Much more must be offered if the pharmacist is to take his proper place on the health team.

With accelerated discoveries of new compounds now and in the predictable future, a staggering number of therapeutic, diagnostic and nutritional agents will be available to all medical groups. In nearly all instances, many products will be suggested for the same general use, and from this maze of old products, new products and product duplications, there will be a real need to select the one or two agents which will best satisfy the requirements of the specific malady of the patient.

Today, there are signs of unrest in the ranks of clinicians and pharmacologists as many new products rapidly reach the market with over-enthusiastic promotion. Their reflections are being documented in various medical publications, and one need only review their papers to feel the earnestness of their dissatisfaction with the present state of drug promotion and product claims.

It appears that the physician today is in a quandary as to which drug he should use. With further advances in science and medicine in the future, the physician's problem of selection will be even more complex as is well recognized by a number of leading clinicians and clinical pharmacologists. In most instances, their answer, if there is one, is that the physician himself should have the necessary interest and training for drug evaluation. Obviously, the practicing physician cannot conduct human experiments each time a new remedy reaches him; he must secure his information from other sources and then reach a conclusion from available reports on the action of the drug.

The inescapable fact is that the medical practitioner will need even more help in the future to determine the drug of his choice. Is it so far-fetched to think of the pharmacist as the one professional member of the health team who could serve most logically as the drug consultant? This implies, however, that the pharmacist himself must be able to distinguish the advantages of one product over many other products having the same general use with respect to principal therapeutic action, side effects, counter indications, dosage forms, and cost, and should present his impartial opinions when requested. Such profes-

sional service is already available in a number of hospitals where pharmacists function as secretaries of pharmacy and therapeutics committees.

In order to estimate the value of a particular agent, the pharmacist must be familiar with animal and human experimentations used by the pharmacologist and clinical investigator to determine the merits of a new compound. This portion of the course must be designed to include relevant subject matter to supplement the student's background in dealing more effectively with the problem of drug evaluation.

In discussing experimentation, time must be allotted to experimental design and statistics. Consequently, early lectures should be devoted to reviewing how animal and human experiments have been conducted, perhaps also how they might be improved. Reasons for the use of statistics, their limitations, and their use can also be discussed.

Since the student has already had pharmacology, he will be aware of the "objective" and "subjective" methods of measuring drug responses in both animals and humans; thus, the teacher need only review briefly the methods of measurement, continuing in more detail by contrasting the advantages of objective methods with the pitfalls and limitations of subjective measurements. Yet, the subjective method is the only method at present of evaluating a number of therapeutic agents, and consequently further discussion will be necessary to illustrate the proper setup for those clinical experiments dealing with pain-relieving and mood-altering drugs.

After general consideration of experimental design and statistics, the teacher is ready to present and discuss the various factors which may affect clinical evaluation. For this, it may be best for the instructor to review the salient features presented by Modell and Houde (5) in their article entitled "Factors Influencing Clinical Evaluations of Drugs." The authors consider the following factors:

1) Pharmacodynamic action
2) Dosage
3) Choice of subject
4) Use of controls
5) Collection of data
6) Sensitivity of the method
7) Placebo actions
8) Bias
9) Forces extraneous to the experiment

The status of the "double-blind" technique in present clinical experimentation should receive special attention in the lectures. Furthermore, the emergence of the placebo as a control and its effect on the results of the study can be woven into the discussion of the double-blind method in those experiments where subjective responses are used to evaluate a new drug. Beecher (6) found that the placebo would prove effective (as a drug) for approximately 36 per cent of all patients where subjective responses are measured.

The student should be warned of the biases which can creep into the clinical evaluation program. For example, it is well known that a physician can communicate a feeling for or against a new drug simply by his manner of talking to the patient.

In presenting the above information, the teacher can draw heavily on outside readings to supplement his lecture material. Admittedly, the organization and scope of the subject will depend upon the student's previous background and the teacher's resourcefulness and desire to implement the discussion with speakers, films, and library assignments.

One should keep in mind that although clinical evaluation based upon scientific methods is still in its infancy, progress is being made each year, and in the future, standard procedures of clinical testing will doubtless evolve which will diminish many of the disadvantages currently seen in drug evaluation. The pharmacy teacher and his students will thus have available a growing body of knowledge as the years pass. Fruitful application of the basic concepts of this course by the student in his future practice of pharmacy will help to give him poise and assurance in his dealings with the medical practitioner.

Drug Evaluation (Pharmaceutical Aspects). Up to this point in our discussion, we have been chiefly concerned with the teaching of drug evaluation from a therapeutic viewpoint. There are still the underlying pharmaceutical aspects of the drug itself to be considered. In most instances, medical practitioners have overlooked this aspect of drug evaluation because of their lack of appreciation or understanding of physical drug systems. For example, physicians will generally see no difference between tablets generically equivalent, but made by different manufacturers. Frequently, this may be the case; but as the experienced pharmacist is aware, one such tablet may have certain advantages over another. We must also keep in mind that one dosage form may make a drug more advantageous than another dosage form of the same generically named drug.

This leads us to the world-wide problem of generic versus trade-marked names. Here is an excellent opportunity for the teacher to stimulate the student in drawing on his background in pharmacy. For example, product A may have a sustained release action which is not present in product B, even though both contain the same therapeutic agent in identical amounts. In another instance, the same drug may occur in two different products, but the first product may have been formulated in such a manner as to have greater stability than the second. It should not for a moment be forgotten that the esthetic qualities of a medicament or the convenience of administration are factors that make one product more desirable than another, all other things being equal. Finally, the student should understand the importance of packaging. This factor will become more important in the not too distant future, when plastic materials will be increasingly utilized in a variety of unique ways to dispense medications.

The teacher would be remiss if he did not include the factor of cost. Judgment of exotic dosage forms or formulations should be solely on the basis of advantages to the patient and not influenced by slick promotional features. The student must continually be reminded that his professional duty is first to the patient.

Application of Drugs to Disease. A pharmacy course would not be complete without a review of current therapeutic agents. This phase of study should comprise the last half of the course. The teacher's approach should be based, first, upon discussion of the ailment, including etiology and symptoms, and, finally, upon recommended drug therapy. Only in this manner will the pharmacy student of the future learn to understand and appreciate patient care. Since the role of the future pharmacist will be to advise the physician on matters of medication, a knowledge of therapeutics is essential and will thus strengthen the student's ability to communicate with the physician on a medical and professional level.

The subject matter to be included in this part of the course can follow a variety of procedures based upon the preference and desire of the teacher. After the disease is described, the teacher can discuss the drugs currently available for its treatment. Both generically-named agents and specialty products should be reviewed, with continual emphasis on advantages or disadvantages of one product over another, from the point of view of both therapeutic action and pharmaceutical design. Here also, under the appropriate ailment or disease, new and unique dosage forms as well as specialized compounding procedures may be discussed. In this last portion of the course, the teacher has reached the level where he can integrate information the student has received from his previous courses with modern concepts of drug therapy.

Laboratory. The laboratory sessions should be devoted to filling and compounding representative prescriptions, learning to develop formulas for a particular dosage form, and testing various dosage forms. It is hoped that the student will have already acquired sufficient background and technical facility from introductory pharmacy courses to justify a substantial reduction in the amount of time usually allotted to compounding practice in conventional dispensing courses.

During the year, the student will be assigned a number of problems in formulating various dosage forms. Very little information will be supplied to the student other than the name of the active ingredient and the desired mode of administration. The student must then build a formula around the active ingredient by laboratory experiments using available literature with a minimum of help from the instructor. The final product may be a solution, suspension, emulsion, or any dosage form the student feels most suitable for a given therapeutic agent. He must, however, have valid reasons for his choice. When the student feels that he has produced an acceptable product, he then submits it, together with a product development report indicating what literature he has consulted, the experiments he has conducted and the pharmaceutical value of the final product. Depending upon the size of the staff, this function of the laboratory work can be augmented in a way that can more fully tax the student's ingenuity. Proper guidance at this time can go a long way in helping mold the student's thinking in a logical and scientific manner.

Finally, the student is assigned from time to time a problem where he must test various dosage forms. In these problems, proprietary products are included and a certain property studied. For example, tablets may be studied for disintegration rates, rate of release of active ingredient, color, stability, and quality of coating. Obviously, these testing procedures will in a large part be dependent upon laboratory equipment and adequate staff. Nevertheless, students should conduct testing methods so that they may better appreciate the advantages or disadvantages of certain drug products containing the same drug.

Conference. Each week a group of students should meet with one of their instructors to discuss in detail certain problems which were mentioned in the lectures. Reviews of medical publications should then be undertaken which will help the student to appraise experiments and conclusions in the literature. Medical advertisements and claims can also be discussed in these conference periods. From time to time, the students should be assigned to drug evaluation teams and permitted to select a drug for evaluation. A report is then written on the evaluation and presented to the class, and questions may

be raised by other students or the instructor concerning the report. In these conferences, it should always be kept in mind that the student should be the one to do the work and the thinking. The role of the teacher is only that of guide. Case history methods may also be used in these conferences, and the application of group dynamics may enliven the sessions. Occasionally, faculty members from other fields may be invited, from pharmacology and pathology, as well as experts from industry and government, to represent specialized fields of knowledge. This interdisciplinary approach can add additional interest to conferences.

CONCLUSION

How much time should be allotted to a terminal dispensing course as outlined above? It appears that three lecture hours, one conference hour, and three hours of laboratory work over a period of a year would be the minimum.

The approach suggested is not intended to give all the answers to the perplexing problem of how to revamp the dispensing course of the future. One thing, however, is certain. If our schools are to prepare future drug consultants, then a dispensing course along the lines described in this paper would seem to be highly desirable.

REFERENCES

1. Procter, W., *Am. J. Pharm.*, 30, 516 (1858).
2. Cited in *Journ. Mondial de Pharmacie*, 1960, No. 1, p. 56.
3. Ministry of Health, "Final Report of the Committee on Cost of Prescribing," London, England, 1959, p. 50.
4. Welsh, A. L., "Psychotherapeutic Drug," Charles C. Thomas, Publisher, Springfield, Illinois, 1958, p. vii, ix-x.
5. Modell, W. and Houde, R. W., *J.A.M.A.*, 167, 2190 (1958).
6. Beecher, H. K., *J.A.M.A.*, 159, 1602 (1955).

. . . I believe the college is the place to begin the business of teaching high ethical standards. . . . Even though one has received that kind of training in a college of pharmacy, if one goes out into a profession that does not maintain those standards he will have a tough time of it.

J. Hillis Miller, Am. J. Pharm. Ed., 13, 283 (1949)

HALF OF YOUR STUDENTS WILL BE HOSPITAL PHARMACISTS!

WILLIAM M. HELLER

INTRODUCTION

Fifty per cent of this year's pharmacy graduates will have practiced in hospital and clinic situations before they terminate their careers. This may well be a conservative estimate; yet at a hospital pharmacy seminar this spring at which a group of pharmacy educators discussed the education of pharmacists for hospital practice, one dean protested that he could not alter his curriculum for "only 5 per cent" of his students. I wonder how many times students in that school have objected to studying certain subjects and have been told that they were not being educated only for the practice of pharmacy today, but for pharmacy of the future!

Let's do that!

TRENDS IN HOSPITALS

What will the future bring? The practice of pharmacy will be greatly changed within the next generation by uncontrollable (by pharmacists) economic, social, political, scientific, and medical pressures outside of pharmacy. We need not dust off the crystal ball—we need only dust off our eyeballs and recognize these forces which are now at work.

For instance, it is probable that legislation for some form of government-sponsored medical care for the aged will be enacted at this session of the Congress. Is this new? Of course not; we have been fighting it, or at least hearing about it, for years. In fact, the United States of America is the only industrialized country in the world in which such legislation does not exist. Since such legislation will represent a victory of citizen and governmental groups over medical, pharmaceutical, and other private practitioners in the health sciences, is it not reasonable to expect that they will compromise so that such care as is initially made available will be dispensed through agencies controlled by citizen and governmental groups: that is, through hospitals rather than through private physicians and private pharmacies? It is estimated that 26 per cent of ethical drugs are now distributed through hospitals—who employ only 4 per cent of the nation's pharmacists. As this proposed legislation takes effect to a greater or lesser extent in the next couple years, these few pharmacists may find themselves dispensing well over a third of the nation's ethical drugs.

Other extra-pharmaceutical forces which are increasing their impact on hospitals and hospital pharmacy are discussed in a recent article by one of our foremost hospital administrators (1). He believes that research is bringing more patients to hospitals by opening avenues of therapy for previously untreatable conditions, and that many new drugs will be so potent and their use so exact that they can be administered only to hospitalized patients. The volume of pharmaceuticals dispensed by the hospital pharmacy is increasing both in total and in terms of volume per patient per day. The cost of pharmacy services per patient day is increasing as complex but specific drugs are developed for particular diseases and for which volume production will never be feasible. The hospital is developing as the health center of the community, and there is a significant trend toward establishment of facilities such as physician's offices and pharmacies either in or adjacent to the hospital.

These are positive factors increasing the need for pharmacists in hospital practice. Add to these the negative factors, such as the decreasing opportunity for an individual pharmacist to own and operate his own pharmacy as community pharmacies increase in size, in the need for working capital, and in competition from non-pharmacy retail establishments as well as mail-order pharmacies and other types of quasi-pharmaceutical operations, and the great majority of pharmacists will be employed pharmacists rather than self-employed. It would seem that hospitals with their professional working atmosphere, well-established personnel practices, increasing salaries, retirement programs, etc., would be in a very favorable position to compete for pharmacists.

These factors will increase the number of pharmacists in hospitals. Many hospitals not now employing pharmacists will have them; those now employing pharmacists will want more of them.

MEDICATION PREPARATION

However, the most important reasons for my opening statement that half of this year's graduates will practice pharmacy in hospitals can be summed up in one-two-three order:

1. More compounding of pharmaceuticals is carried out each day on each nursing unit than in the hospital pharmacy (e.g., addition of medications and electrolyte concentrates to intravenous solutions); the tremendous shortage of nurses, which shows no signs of abating, will soon require nurses to give up this "medication preparation."

2. Even if nurses or physicians had the time, they do not have the educational background to keep up with the increasing physical and chemical complexity of today's pharmaceuticals.

3. Only the pharmacist has this educational background; furthermore, he combines this with a knowledge of the effects and the modes of action of drugs, making him a potentially valuable consultant to the physician in the choice of drugs to be employed.

Result: Pharmacists are needed in the hospital twenty-four hours a day, seven days a week, to prepare and package all medication in final form ready for the nurse to administer to the patient, and also to serve as a part of the hospital's professional team in the promotion of the best drug therapy.

This means that, in general, the pharmacist will have added any drugs to intravenous infusions at the time they are dispensed for administration to the individual patient, the pharmacist will dispense all other injections pre-measured and compounded, and all other discrete dosage forms (tablets, capsules, suppositories, etc.) will be dispensed in individual packages ready for administration to the patient and received by the nurse just prior to the time they are to be administered.

Most important medication orders will be given directly to the pharmacist rather than transmitted to the pharmacy through nursing service. The physician will be in consultation with the pharmacist when medication orders are initiated.

The pharmacist will not only be available for informal consultations on drugs and drug therapy, but will assume an active role in the promotion of good drug therapy through the maintenance on every patient care unit of an up-to-date information-type formulary of the drugs in use in that hospital, by producing pharmacy bulletins with information particularly appropriate and current to the needs of that hospital's medical and nursing staffs, and by formal lectures to

members of the other professional staffs, as well as his own, in the in-service training programs.

The number of pharmacists needed to fulfill these responsibilities is astronomical, compared to those now in hospital practice. A 100-bed hospital would need at least five pharmacists, whereas it may now have only one. The smallest hospitals would need at least one pharmacist.

How can the hospitals afford such extensive pharmaceutical services? For too long pharmacists have promoted themselves to hospital administrators by declaring that they can make, or save, money for the hospital. This is shortsighted. The decision to employ pharmacists should be based primarily on professional needs rather than on anticipated economic advantages. Decisions in patient care are necessarily determined by professional factors and oftentimes almost without regard to economic consequences.

If pharmacists do not fulfill these responsibilities, others will have to fill them to the best of their abilities: the physician will continue to try to keep the other members of the team informed on drug therapy, the nurse will continue to compound certain medications, but the bulk of medication preparation will become the responsibility of sketchily trained lay helpers on each nursing unit.

UNDERGRADUATE EDUCATION FOR HOSPITAL PHARMACISTS

The question is whether today's pharmacy graduates have a basic education which will enable them to grow sufficiently professionally so that they can carry out these functions. If not, why not? If not, what must be done?

That hospital pharmacists themselves have not all been satisfied with progress in the education of pharmacists for hospital practice is evident from a review of the literature. This dissatisfaction was climaxed by a proposal for an independent American College of Hospital Pharmacy (2).

Progress is, however slowly, being made. The AACP has for several years had a Committee on Hospital Pharmacy Education, the Committee on Curriculum now includes a hospital pharmacist, and the AACP and the American Society of Hospital Pharmacists are forming a joint committee to discuss items of mutual concern. Committees of the ASHP have prepared syllabi for courses in hospital pharmacy administration (3), central sterile supply administration (4), and radioactive isotopes (5).

In 1957 the AACP established a special Committee on Hospital Pharmacy Education. The report of this Committee (6) described a program which was declared to be "a modest start at the undergraduate level towards specialized training in hospital pharmacy." The Committee agreed that all scientific and professional courses required of students interested in retail pharmacy would also be necessary for those interested in hospital pharmacy, but that a minimum of three additional courses must be available to provide the "modest start" for prospective hospital pharmacists:

1. Hospital Pharmacy Management or Hospital Pharmacy Administration, two credit hours for one semester. This is essentially an orientation course to expose the student to hospitals and to the environment in which pharmacy is practiced therein. Whenever possible, hospitals should be used as *in vivo* laboratories for this course.

2. Hospital Pharmacy Seminar, two credit hours for one semester. This is a course extending the breadth and depth of the course in management. Rather than using the lecture technique, the instructor should use library research papers

presented by the students as the basis of discussions of problems and trends related to hospital pharmacy.

3. Manufacturing Pharmacy, three credit hours each semester for two semesters. The Committee stated that considerable emphasis should be placed on sterile products, both large and small volume injections, allergenic extracts, ophthalmic solutions, and irrigating solutions. The hospital pharmacist needs an introduction to product development, to small-scale manufacturing and the necessary equipment, and to proper control procedures. Because of the hospital pharmacist's great responsibility for the selection of brands of drugs, the course should be taught so as to enhance his knowledge of the pharmaceutical manufacturing industry.

In addition, the Committee pointed to the need to incorporate into existing courses such subjects as medical terminology and the dispensing of radioactive isotopes and recommended that the course in public health be upgraded.

GRADUATE EDUCATION

The following year the Committee on Hospital Pharmacy Education devoted its efforts to consideration of the graduate programs. The Committee reported (7) that "hospital pharmacy needs men with graduate education and/or training. This is based on the feeling that the specialized area of hospital pharmacy requires more training than the present four year course does provide or that the five year course will provide. Even if the courses in manufacturing pharmacy, management and seminar recommended by this Committee as suitable undergraduate material were provided by all colleges, they would provide only a 'basis' for a student interested in this area."

The Committee has been unable to meet to discuss the patterns and philosophy of graduate instruction in hospital pharmacy. The current chairman has supported graduate education by the traditional route, i.e., the M.S. and Ph.D., and including an internship or residency in hospital pharmacy (8).

DOCTOR OF PHARMACY DEGREE

Many practicing hospital pharmacists, however, believe the Doctor of Pharmacy (Pharm.D.) degree would be more meaningful. While there has been some expression concerning course content for the Pharm.D. program (9), I suspect most hospital pharmacists are willing to leave the program content to pharmaceutical educators, trusting that the programs offered will be equivalent to those offered for other professional degrees in the health sciences.

The Committee on Curriculum this year adopted a statement emphasizing that the Doctor of Pharmacy degree is a professional degree of value primarily to pharmacists who engage in professional practice in hospitals or in retail pharmacies and recommending that half of the sixth year consist of six months of supervised clinical experience plus courses appropriate to the specialty chosen.

While both the traditional graduate programs and the Pharm.D. programs are of considerable value to hospital pharmacists, particularly those engaged in management or supervisory positions in their departments, it must be expected that the majority of pharmacists in hospital practice will have the same five-year collegiate experience that retail pharmacists will have. There will probably continue to be considerable interchange of manpower between the two fields, but those students who have had at least the three undergraduate courses suggested by the Committee on Hospital Pharmacy Education will have a definite initial advantage.

INSTRUCTORS MUST BE AWARE OF HOSPITAL PHARMACY

Perhaps the greatest advance possible in the education of pharmacy students would be for pharmaceutical educators to rid themselves of any tendency to consider retail pharmacy as the only destination of all but a few of their students. If half of our students are likely to practice in hospitals, then applications to hospital pharmacy practice should be noted by the instructor in every course. In microbiology, as an example, emphasis should be given to the choice and use of detergents and disinfectants (the hospital pharmacist is consultant to the housekeeping department and to the nursing and medical staffs about these products); sterilization by heat, steam, and bactericidal gases (the pharmacist may be responsible for the central sterile supply department and the pediatric formula room); the effect of radioactivity on microbes (the pharmacist may be responsible for dispensing and preparing solutions of radioactive isotopes); aseptic techniques (the pharmacist of the future will not only manufacture sterile pharmaceuticals but will, as I stated above, assume from the nursing service the responsibility for compounding and packaging of each dose of an injectable); and antimicrobial therapy (for the pharmacist will not only be a consultant informally, but will be a teacher in the formal in-service training programs).

Pharmacists are exerting increasing pressure through the boards of pharmacy to force hospitals to employ pharmacists. Every hospital, regardless of size, should have a pharmacist in charge of its pharmaceutical services. Having talked to both hospital administrators and to pharmacists, I have concluded that the fault more often lies with the pharmacist—he simply does not understand the hospital's needs; he does not know how he can be of real service. As a student, he did not learn enough about pharmacy in hospitals.

CONCLUSION

The next twenty-five years will be characterized by an ever-greater need for pharmacists in hospitals. The great majority of today's graduates has not been educated to fulfill satisfactorily these enlarging pharmaceutical functions in hospitals. Unless pharmaceutical educators make a radical change in emphasis, pharmacy graduates will be too uninterested in hospital pharmacy and too inadequately oriented to assume the tremendous opportunities for pharmacy which await our attention.

REFERENCES

(1) Brown, Ray E., *Hosp. Mgt.*, 89, 92 (1960).
(2) Francke, Don E., *Am. J. Hosp. Pharm.*, 16, 53 (1959).
(3) Flack, H. L., *Bull. Am. Hosp. Pharm.*, 13, 443 (1956).
(4) Salvino, Joseph, *ibid.*, 14, 473 (1957).
(5) Latiolais, Clifton J., *et al, ibid.*, 12, 373 (1955).
(6) Rowe, Tom D., *Am. J. Pharm. Ed.*, 21, 267 (1957).
(7) Weaver, Warren E., *ibid.*, 22, 331 (1958).
(8) Weaver, Warren E., *ibid.*, 23, 364 (1959).
(9) Francke, Don E., *Bull. Am. Soc. Hosp. Pharm.*, 13, 443 (1956).

ANIMAL HEALTH PHARMACY

N. M. FERGUSON*

For a number of years pharmacies throughout the country, particularly in small towns, have been providing both farmers and veterinarians with animal health products. The farmer has been interested in the health of his livestock and poultry and consequently has sought information from the pharmacist about insecticides, disinfectants, liniments, udder balms, and, occasionally, mineral supplements. These proprietary products are available in packaged form and contain directions for use. The pharmacist is often called on by the farmer to interpret directions particularly with respect to the proper dilution and mixing of a product when used on the farm. As a result of these inquiries the pharmacist has been required to stock more animal health preparations and, in turn, know more concerning these products. In many cases, a pharmacist's knowledge regarding the use of chemicals and products containing these chemicals, in human medication, aids him in understanding the use intended for an animal health product by its manufacturer.

The pharmacist also acts as an aid and consultant to the veterinarian and makes available to him such chemicals and biologicals as he needs in his practice. The relationship between pharmacist and veterinarian has been and should always be similar to that existing between the pharmacist and the physician. The animal health problem is such a large one as to require close liaison between all parties concerned.

It was with this thought in mind that many of the colleges of pharmacy in the country established courses in animal health pharmacy. The pharmacist, through his training and interest in health problems, is well qualified to handle animal health products. Today, with the advent of sulfa drugs, antibiotics, vitamins, and increased use of minerals together with the great host of new specific products for animal health control, a highly specialized training is required to handle animal health products.

A recent survey has shown that roughly two-thirds of our seventy-seven colleges of pharmacy have included a course in animal health pharmacy in their curriculum. In a few colleges this course is required, particularly where the students are drawn from farm communities. Many other colleges of pharmacy plan to include a similar course as an elective in their five or six year programs. Since there are roughly nine thousand pharmacies in the United States which have well-established animal health departments, it is necessary that more pharmacy graduates become acquainted with this important branch of the health sciences.

A course in animal health pharmacy should include subject matter which will enable the pharmacist (1) to realize the importance of animal health in so far as total animal losses are concerned with respect to the farmer's income as well as with respect to the economy of the nation, (2) to understand the chemistry, pharmacy, and pharmacology of the medicinals required by the veterinarian in controlling animal contagion as it relates to the spread of disease among animals as well as to the spread of disease to human beings from farm animals, (3) to

* Secretary, American Animal Health Pharmaceutical Association.

obtain a general knowledge of the proprietary products which are sold over the counter to the farmer and rancher, (4) and also to obtain a knowledge of the modes of administration of drugs used in veterinary practice and of the dosage required for each species of domestic animal. In addition to this information the course in animal health pharmacy is designed to give the pharmacist a knowledge of insecticides, rodenticides, and weedicides since these products serve in some sense as a means of controlling the spread of disease.

COURSE OUTLINE

1. Introduction: meaning and scope of animal health pharmacy; problems involved; relationship to the veterinarian.
2. Basic information about livestock and poultry: genetic relationships and sex terminology; foundation strains; management problems such as cleanliness, ventilation, water supply, food, parasitism, etc.
3. A brief discussion of the anatomy and physiology of livestock and poultry.
4. Animal and poultry feeds and feed supplements.
5. Common parasites of livestock, poultry and pets and products used for their control.
6. Common diseases of livestock, poultry, and pets.
7. Rodent and weed control on the farm.
8. Veterinary prescription compounding.
9. Inter-professional relations; services performed for the veterinarian by the pharmacist.
10. The animal health department and its organization.

Although in some colleges of pharmacy information on animal health pharmacy is given as a part of the course in dispensing or the course in pharmacology, most colleges have a separate two semester hour course in animal health pharmacy.

A good general education serves to develop those traits of character and personality that are required for success in any occupation. To have some insight into the values and standards that men have found good in governing their lives, to be able to communicate ideas clearly, to possess the ability to deal with people in a friendly and considerate manner—these, more commonly than we think, perhaps are some of the elements of professional competence. And these are among the qualities of mind and character that general education is designed to develop.

Lloyd E. Blauch, Am. J. Pharm. Ed., 13, 454 (1949)

THE UNIVERSITY-WIDE HONORS PROGRAM AT WASHINGTON STATE UNIVERSITY

SIDNEY G. HACKER

From earliest times the education of youth has been an object of criticism. In our own time the most popular target has been the American high school. But recently many high-caliber writers have set their sights on the universities. It is cruel sport, considering the speed with which the quarry moves, and his wit and vision.

There is no need here to draw up a bill of particulars. We all know the shortcomings of the typical university education. There we seem to be always doing what we ought not and not doing what we ought, leaning—as Matthew Arnold cautioned against doing—upon the thought that chance will bring us through.

As is our custom, we have had to relearn in the university the primary lessons. We have once again mastered the finding of the lowest common denominator and the highest common factor in education. Money, time, and energy have been and are being spent, with abandon, on the incapable and the mediocre. For some students reinstatement has become a way of life.

But there is talk that a new era in American university education is beginning. A new pattern in pastel shades is being stamped on the gown which is being made to clothe the university graduate. We are not yet sure that the dye will not run. There is seldom any attempt to weave a new design into the fabric. However, one thing that is new is the serious attempt to make the article in sizes to fit the wearers.

This new concept goes by various names but the most common is "Honors Program." There are probably one hundred fifty universities in this country about to embark on such programs. The reader will find stimulating and instructive accounts of these in "The Superior Student: The Newsletter of the Inter-University Committee on the Superior Student," which may be obtained for the asking from Professor J. W. Cohen, University of Colorado. This Committee, referred to by the initials "ICSS," has been and is being supported by the Carnegie Corporation. Under the guiding genius and missionary zeal of Professor Cohen there is a resurgence of faith that ways can be found at long last to provide, in recognized fashion, a superior education for university students of superior ability.

It is not an easy matter to start an Honors Program in any university. It is almost impossible to start one on a university-wide basis. Usually programs begin very modestly and never get beyond the College of Sciences and Arts. It is almost unheard of to include the professional schools within a common framework of honors work. Formulating any honors program is not to be undertaken lightly.

I am going to describe the University-wide Honors Program at Washington State University. But before doing so I would like to take this opportunity to thank the School of Pharmacy for its support from the beginning and up to and including the final faculty meeting at which the program was adopted.

It is not a perfect program. No one can say he is completely satisfied with it. Concessions have had to be made and some of these are obvious.

After eight months of very hard work by the Honors Council, the faculty of the University adopted the Program on May 17, 1960 by a vote of three to one. This was so late in the year that it was decided to inaugurate the Program in all its formal aspects in the fall of 1961. Meanwhile during 1960-61, for selected students by a screening described below, the new honors courses and honors sections of existing courses as cited in the initial phases of the Honors Program will be offered during 1960-61 as staff and scheduling permit.

This Honors Program places emphasis on scholarship both in breadth and depth. It starts at the beginning of the superior student's University career. It has a sequential and pyramidal structure. It shuns dilettantism. It emphasizes completeness of scholarship. And it places at the appropriate time the main responsibility for the superior education of the superior student where it belongs, namely, on the student's major department. Within the framework of this Program every department, school and college can and is expected to do what it thinks best for its own most talented students. As experience with the Program is gained it will necessarily undergo adjustments and revision. The Program will need continual scrutiny and evaluation. It is hoped and it is believed that the Honors Program will eventually have a most beneficial influence on instruction at all levels for all students in this university.

Mr. Justice Cardoza once remarked that "Whatever goes out of one as effort comes back to him as character. The alchemy never fails." I am sure that the efforts which the faculty and the superior students will expend in the earnest realization of the Honors Program will come back in the form of character for the *University as a whole*. Here too in this broader aspect will be found the magic alchemy of mind and heart.

Objective of the Program. The primary objective of the Honors Program is the promotion of the educational well-being of the superior student and the encouragement of a broad, appreciative, and understanding scholarship, with intensive education of the superior student in his chosen major field of study.

The approach is broad to the extent that the student will be expected to acquire an appreciative understanding of the natural and social sciences, of the arts, of language and literature, and of the historical development and philosophies of the culture of the world. Where possible the course of study is sequential and pyramidal, building on sound foundations. Emphasis will be placed on the student's articulate presentation in writing and by spoken word of what he has learned from lectures, reading, and contemplation. The student will be expected to correlate ideas, to examine facts and opinions critically, and to express cogently and effectively both his own ideas and his considered critiques of what he learns from others.

Education in depth will be the responsibility of his major department. There is no substitute for proficiency in one's chosen field. It is to be hoped that every opportunity and stimulus will be provided the superior student to develop his creative abilities.

"Associates" of the Honors Council. Besides the Members of the "Honors Council," each appointed directly by the President of the University, there will be one or more representatives from the departments or schools or colleges of

the University who will be called "Associates of the Honors Council." These Associates will be nominated by the Members of the Honors Council, and appointed by the Dean of the Faculty. It is expected that an Associate may be reappointed each year for any number of years. The number of Associates will be determined by the Members of the Honors Council, but they will be chosen so as to be adequately representative of all departments, schools or colleges of the University and will include members of the faculty who are then currently teaching Honors courses as well as those who are not currently so engaged.

The University faculty will be kept continually informed of the work in the Honors Program and will receive copies of all literature given to prospective students or students already enrolled. Liaison between the Honors Council and individual departments will be a primary responsibility of the Associates of the Honors Council. The faculty and the appropriate committees of the University will have continual opportunity to review the Program as it develops, to formulate policy, to initiate and to order changes which are in the best interests of the program, consonant with faculty and administration policy.

The primary responsibility will be the promotion of the educational well-being of the superior student but in so doing to provide every possible intellectual aid and stimulus to the student body as a whole.

It is essential to an understanding of the Honors Program to appreciate that: (1) only truly superior students will be involved, at any stage, in the program; (2) students in the Honors Program, from the beginning to the end of their University careers, will be given very careful and continuous guidance and advice.

Selection of Students. (1) *Entering Freshmen.* Approximately the top 10 per cent of the entering freshman class will be invited to join the Honors Program. The Honors Council will select freshmen for the program on the basis of high school grade point average, scores from college and pre-college testing programs, and upon information obtained by correspondence with the student and his school advisors or by personal interview. The mechanics of screening prospective students, inviting applications and selecting applicants will be arranged by the Honors Council in cooperation with the Admissions Office and the Testing Center of the University. A continuous check on methods of selection will be made and careful records maintained in order to provide a basis for improving the selection process as the program progresses. Enrollment in the Honors Program will be optional with the student, and the invitation to enroll will be extended to everyone who can be found to qualify from any of a wide variety of criteria.

(2) *Transfer and Foreign Students.* The eligibility of transfer and foreign students will be judged in each individual case, on the basis of the student's knowledge and competence in the work which he has done elsewhere, by the Honors Council in consultation with appropriate advisors. All such students must take the Sophomore Comprehensive Examination and pass it creditably. Foreign students who enter as third year students must take this examination before being allowed to enroll in the Honors Program.

(3) *Opportunity to Drop or to Enroll at a Later Date.* Any student may drop out of the Honors Program at any time (within existing University rules) and the honors courses he has taken will, as appropriate, be credited to him, for

example toward what are called here "General University" requirements. A student will be expected to enter the Honors Program no later than the end of his second year of study (or the beginning of the third year in the case of foreign students or certain transfer students who must then creditably pass a Sophomore Comprehensive Examination over the work which they propose to transfer). Some students reach an intellectual maturity rather late and in meritorious cases exceptions will be made to the foregoing general rule after careful consultation between the Honors Council and the student's particular department.

Role of Continuous Advising. The role of continuous advising of the student is of paramount importance in the whole program. This will be done by the Members and Associates of the Honors Council and by department advisors in the cases of students who have elected their majors, within the framework of and in cooperation with the Curriculum Advisory Program, which is already in operation here.

The continuous advising of students is an integral part of the Honors Program and its operation. This is a primary means by which many individual situations will be handled and particular problems will be resolved.

The Matter of "Good Standing" in the Program. In order to maintain his "good standing" for continuing enrollment in the Honors Program a student must maintain an over-all B (3.0 GPA) average and also maintain this same over-all average in honors work, and he must undertake honors work which the Honors Council recommends. Exceptions to this general rule may arise for certain students who wish to remain in the Program or to enter it, and these exceptions will be decided with a view to the student's best interests by the Honors Council in consultation with the student's various instructors and major department. Exceptions will be made, because the Honors Council will not place emphasis solely on grades.

Insofar as possible, ways will be sought to de-emphasize grades *per se* in all honors work and in the determination of Graduation Honors. The student will be judged primarily on his genuine desire and ability to learn and to comprehend and in the light of his realization of his own intellectual potentialities. Insight and understanding will be acknowledged and grade-performance *per se* will be discounted.

Graduation Honors. A candidate for an undergraduate degree in either a four-year or five-year program will become eligible for graduation honors in the following way.

A particular form of inquiry will be sent regarding each senior in the Honors Program to selected members of the faculty of the University who have had this student in class calling for a brief confidential evaluation of him as a scholar. Consideration for "University Graduation Honors" will be given on the basis of (1) these reports, (2) his over-all record as exhibited by the transcript (namely, with regard to the extent of his training, consistency of performance, GPA, fields of best performance and of weakest performance, etc.), (3) the written recommendation of his major department, (4) the extent and quality of his Summer Reading, if any, (5) his performance on his Sophomore and Senior Comprehensive Examinations and his relative improvement, and (6) his Senior Honors Thesis or Project, if any. Details with respect to the items of the Program mentioned in (4), (5), and (6) are given below.

Students who are in the Honors Program may be graduated on the foregoing basis with "Honors," "High Honors," or "Highest Honors." In addition a student of merit who is—for whatever reason—not in the Honors Program may be graduated with "Distinction" upon recommendation by his major department or school, and the concurrence of the Honors Council.

Restriction of Enrollment in Honors Courses. Any course in any department which is designated as an "Honors" course will be open only to the following classes of students: (1) students enrolled in the Honors Program; (2) students of superior ability majoring or minoring in the particular field, as permitted by the department offering the course; a student will not be eligible for an Honors course or Honors section merely by virtue of the fact that he is majoring or minoring in the field in which this work is given; (3) students of demonstrably superior ability who are not identified by (1) or (2) above, as permitted by the department offering the course.

An Important Qualification with Respect to Course Requirements. When reference is made below to an honors course being "required," it should be understood that in every case, everywhere, the addendum "or equivalent" is a part of the statement. Both this phrase, "or equivalent," and the explicit word "optional" mean *"as required by the student's major department."* For example, the statement that every honors student must take "Physical Science Honors" "or equivalent" means that he is required to take this Honors Course "unless as part of his departmental requirements, the student is taking or has taken departmentally required courses in physics or chemistry." Similarly for the Biological Science Honors course, the student may have taken or be taking equivalent departmentally required courses in botany, zoology, and so on. Again in further illustration, a student majoring in a social science field may be required by his department to take certain other courses in the social sciences and then this student would not be required to take the specified social science honors courses unless his department requires him to take these or certain of these.

It is hoped that eventually in every course with large enrollment where and when practicable and permissible (i.e., with respect to administration small-class-rules, etc.) one or more *honors sections* will be established. If an Honors Program student takes a course where such a section is available, as part of his requirements, he will be expected to enroll in the honors section.

BRIEF DESCRIPTION OF HONORS PROGRAM COURSES

The Honors Program courses are briefly described below. Synopses of the courses are indicated. Eventually complete syllabi of all honors courses will be published by the Honors Council.

(a) University Lectures and Readings. Weekly selected one-hour lectures on fields of study available at this University will be given by speakers invited by the Honors Council after consultation with departments. The content and character of the speaker's field of study, suitable and appropriate to the audience will be presented together with suggested informative short readings. Such matters as employment opportunities will not be discussed. Honors students will be expected to attend. But any freshman student, whether or not he is in the Honors Program may attend. No credit will be given. Some twenty-five lectures will be presented.

(b) English for Honors Students. This course will be devoted to both English composition and literature. It will be an extension of the current Freshman English Honors. This work will consist of two three-hour semester courses both of which the student will be expected to take in his freshman year.

(c) Mathematics for Honors Students. (1) The Mathematics Department now gives honors courses in Math. 107 (College Algebra and Trigonometry, five hours), Math. 207 (Analytic Geometry and Calculus I, five hours), Math. 208 (Analytic Geometry and Calculus II, five hours), Math. 315 (Differential Equations, three hours). Engineering and other science students who are in the Honors Program will take these courses, as required by their respective departments. The entering freshman in the Honors Program who would normally take these courses (e.g., engineers, other science majors, etc.), will be required to take *Math. 107 Honors and Math. 207 Honors* in his first year.

(2) However, there will be a new Honors Program course in Mathematics for *non-science students*. It will be called *Concepts of Mathematics*. This will be a two-semester course, each three hours credit. Applications to the social sciences, primarily, and to certain aspects of the biological sciences, rather than to engineering and physics, will be given. All Honors Program students who do not take *Math. 107 Honors* will be required to take the first semester of this course. The second semester will be optional. But if this second semester's work is not taken, then the student will be required to take a three-hour social science honors course in addition to the two such courses required in the program, as explained below. The student who takes this six hours of Mathematics Honors will be prepared to enroll in Mathematics 207 if he wishes to go on.

(d) Social Science for Honors Students. Every student in the Honors Program will be required to take two of the following six social science courses: Anthropology Honors, Economics Honors, History Honors, Political Science Honors, Psychology Honors, Sociology Honors. In addition, the Honors Program freshman who does not take the second semester of Mathematics Honors must take a third one of these six courses for a total of nine hours of Social Science Honors. In the case of Economics Honors the student will be expected to have completed the first semester of Mathematics Honors (or equivalent).

(e) Physical Science Honors. All Honors Program students will be required to take four hours of Physical Science Honors (with laboratory), for which the first semester of Mathematics Honors (or equivalent) will be prerequisite. This course will be primarily chemistry, but with an introduction to certain physical principles.

(f) Special Note regarding Completion of the Above. All of the foregoing work must be completed by the end of the student's second year of study (or his third year in the case of "five-year programs").

(g) Biological Science Honors. All Honors Program students will be expected to take a four hour course of Biological Science Honors (with laboratory), for which the first semester of Physical Science Honors (or equivalent) will be prerequisite. This course in biological science must be completed before the end of the student's third year of study (or the fourth year in the case of "five-year programs").

(h) Three Special Upper Division Honors Courses. There will be three Honors Program courses required of all juniors or seniors (or fourth and fifth year

students in five-year programs) in the Honors Program, provided that students have not or are not already taking equivalents of these as part of departmental requirements. These courses are: (1) *Development of Western Civilization,* three hours, available only during first semester; (2) *Development of Eastern Civilization,* three hours, available only during second semester; (3) *Domain of the Arts,* three hours, offered during both semesters. These three course names are somewhat meaningless by themselves and a brief description of their proposed content may not be out of place.

(1) *Western Civilization*: "A selective and intensive inquiry based upon materials found in original sources from Greco-Roman antiquity to the present. The material would focus upon western man's quest of ultimate values, the good society, and knowledge of his natural environment. These emphases will be pursued through the changing and cumulative historical influences of the following periods: ancient Greece and Roman Empire; the medieval period; the Renaissance through the eighteenth century Enlightenment; the nineteenth and twentieth centuries."

(2) *Eastern Civilization*: "This course is based on the material found in three anthologies: *The Cultural Traditions of India, of China, and of Japan,* published by the Columbia University Press. The material presented will consist almost entirely of sources, and the student will be led to investigate the development and explore the implications of dominant cultural themes as they are reflected or embodied in these sources. The course will include discussions of literature, philosophy and religion, art, the organization of society, and some science."

(3) *Domain of the Arts*: "A cooperative course offered by instructors of fine arts, music, philosophy, and literature. Through actual experience with music, visual arts, and literature, the student will develop an ability to perceive what is both distinctive and universal among the different forms of art. Attention will be given to an analysis and evaluation of the meanings of critical statements regarding these art forms, as well as others such as the dance and the dramatic arts. A study will be made of some of the basic features common to expression in all the arts such as structure, symbolism, theme, ambiguity, tone, and harmony."

(i) Certain Optional Honors College Courses. (1) *Foreign Language Honors.* A two-semester honors course (four hours each semester, with the first semester (or equivalent) prerequisite to the second) will be offered in each of four foreign languages: French, German, Russian, and Spanish. Classes will be kept to a maximum of fifteen students and it is expected that the training will be such as to accomplish in one year's work what is ordinarily done in two. The foreign language requirement will be optional with departments and may be taken any time during the student's undergraduate career. A department may require more than one language of its Honors students if it so elects.

(2) *Man and His Physical Environment.* This will be a three-hour one semester optional course for Honors Program students, with Physical Science Honors (or equivalent) as prerequisite. It will deal with physical principles, aspects of modern physics, certain astronomical, geological and geographic problems, ecology, and other fields. The interplay of man and his physical environs, and hence both social and biological ecology, will be stressed. This course will be an "integrated" one, but will have the prerequisites which will enable a

reasonably high degree of sophistication in approach and therefore permit the kind of "integration" so often lacking in work called by this name. There will be no laboratory. It will be offered only during that semester following the one during which Physical Science Honors is offered.

(3) *Other Optional Honors College Courses.* (a) It is hoped that as the program develops it will be found possible to offer other such high-level integrated courses as the foregoing one. There are vitally important fields which are commonly neglected. Some departments or divisions of the University may wish to inaugurate courses to remedy these defects in education and it is hoped that some of this work can be brought into the Honors Program.

(b) The Honors Council proposes at an early date to form a discussion group for interested faculty where the general topic of *Turning Points in the History of Thought* will be discussed in an inspirational and informative way. As a result it is hoped that a high-level honors colloquium on this subject can be developed at a subsequent date for Honors College students.

(c) As the Honors Program develops, an effort will be made to establish interdisciplinary seminars and colloquia for upper-division honors students on a university-wide basis and in schools, colleges, and departments as appropriate.

SUMMER READING

In the summers following each of his undergraduate years it is hoped that the Honors Program student will do some profitable summer reading in order to both broaden his outlook and enhance his major field proficiency. Whether or not summer reading is required will be optional with the student's certified or intended major department consonant with each individual student's own situation, both economic and otherwise. The Honors Council will make available a selected list of general reading material. There may also be suggested readings in the courses which the student has already taken which he may wish to pursue. Departments, professional schools, etc., will furnish their own lists for summer reading. In this manner the student may earn from one to three "Honor Hours" of credit, depending on the extent of his reading and the quality of his understanding and appreciation of his reading. This "merit" will be determined by informal examination, either oral or written, or by writing an essay, which will be judged by his major department, and, possibly, in part by the Honors Council. Summer reading lists—departmental and general—will be published by the Honors Council. A reasonable attempt will be made, in so far as is practicable, to make this summer reading literature available to the student by loan from the library.

The purpose of this summer reading program, as indeed that of the whole of the Honors Program, is the "enrichment" of the student's education in contradistinction to any attempt to effect a "speed-up" of that education with a mere view to possibly earlier graduation.

SOPHOMORE COMPREHENSIVE EXAMINATION

In the program a certain level of attainment is expected of the student by the end of his sophomore year. Every Honors Program student will be required to take a comprehensive examination at the end of his sophomore year which shall be over matters of concern to his major department, if the student has chosen his major, as well as over matters which the Honors Council proposes as suitable for examination. The examination will be (1) written, (2) of an extent which the student can be expected to answer within two hours, and (3)

conducted without proctoring or supervision. The material will seek to test the student's insight, comprehension, and ability to synthesize. To this end those questions to be set by the Honors Council will be publicly announced in advance and will present a choice of questions of a kind by which the student has a chance to exhibit his comprehension, facility of expression, and originality of approach.

The Sophomore Comprehensive, as mentioned above, will provide a vehicle by which transfer and foreign students, as well as certain other students, may be allowed to enter the program.

If the student passes the examination he will be given two to three "Honors Hours" of credit, the amount depending on the general merit of the examination. If in the opinion of the examiners the student has not passed the examination, his case will be reviewed by the Honors Council in consultation with his departmental advisor, and the student will be counseled to his best possible advantage.

SENIOR COMPREHENSIVE EXAMINATION

A student in the Honors Program will be required to pass a Senior Comprehensive Examination as early as is feasible in the final semester preceding his graduation, and in no case later than ten days following spring vacation. This examination will be given and administered entirely by the student's major department. It may be oral or written or both, as the department wishes to establish as a general policy. The oral part of the examination should not exceed a duration of one hour and a half, and the written part should not exceed two hours' duration. Some departments electing to give examinations of a particular kind (for example, "take-home" type) may do so following discussion of this policy with the Honors Council. No "Honor Hours" or other credit will be given for the passing of this examination.

SENIOR THESIS OR PROJECT

The value of a "Senior Thesis" or "Senior Project" is more pronounced in some areas than in others. Some institutions put great store in this kind of honors work, feeling that it epitomizes the whole undergraduate work. Other institutions have found the results of this kind of honors work disappointing. Certainly if it is to be done, it should be well done, and there is no use requiring a senior to do a thesis or undertake a project unless there is a reasonable assurance of a level of performance commensurate with his abilities and sufficient time available to do the work properly.

In this Honors Program at this university the writing of a senior thesis or the doing of a senior project will be left optional with the departments or schools and with the understanding that a department may ask one honors student to undertake this sort of thing but not ask this of another honors student. What is in the best interests of the individual student should decide the matter. If such work is done, it may be done for variable credit of two to four hours, and the department will decide the amount of this credit. There will be no requirement, in any case, of such things as length, typing, binding and so on. If a thesis is written or a project done, the department will be the sole judge of the merit of the result. However, on occasion, but not as regular practice, a department may wish to recommend a particular thesis or project of outstanding merit to the Honors Council, and the Council will cooperate in getting the work published or effecting other suitable recognition.

ADVANCED PLACEMENT

Advanced placement credit in the Honors Program will be given in accordance with the qualifications and standards set by the respective departments offering the course or courses in question, in accordance with University policy. It is hoped that an ever increasing number of students will present the necessary qualifications for advanced standing. The effect of this on Honors Program requirements during the first two years will be to eliminate these requirements wherever the student qualifies.

TABULATED SUMMARY OF THE PROGRAM

The Honors Program at Washington State University is summarized in the following table. Of course the value of any course depends upon its content and the instructor. After the Program has been operative and syllabi become available, the Honors Council will be happy to provide any details or other information. Any article of this kind has a sequel. And, as any reader of this journal will appreciate, it is unusual to describe an experiment before it is ever run. But maybe the procedure will encourage others to perform similar experiments.

(*See Table 1, pages 326 and 327*).

TABLE I. SUMMARY OF THE HONORS PROGRAM AT WASHINGTON STATE UNIVERSITY

(Students who major in fields where the equivalent work is covered will of course not take an Honors Course which duplicates this work.)

Course (All are Semester Courses)	**Credit**	**Required (R) or Optional (O)** Note: "Optional" means with Departments, Schools or Colleges, not with Students.	**Year When Required** Note: III or IV may be III, IV or V in 5-Yr. Programs.
Univ. Readings and Lectures (Both Semesters)	0	Expected of all Hon. Coll. Freshmen. Open to all Freshmen.	I
English Honors I	3*	R	I
English Honors II	3*(*Honors Sec. of existing courses)	R	I
Math. Honors I	3 (or 5*)	R	I
Math. Honors II	3 (or 5*) *Note: The 5-hrs. refer to Honors Sec. in present established courses, e.g., Math. 107.	O* *If not taken, 3 hrs. of Soc. Sc. Hon. *must* be substituted.	I
Social Science *Honors*		(Note: These may be Honors Sections of established courses designated by	
Anthropology Hon.	3	(*) or new Honors Courses.)	I or II
Economics Hon.	3	*Two of these six courses must be*	"
History Hon.: American Hist.(*)	3	*taken and if Math. Hon. II is not*	"
Political Sc. Hon.	3	*taken a third one of these must be*	"
Psychology Hon.(*)	3	*taken.*	"
Sociology Hon.	3		"
Phys. Sc. Hon.	4	R, Math. Hon. I Prereq.	II
Biol. Sc. Hon.	4	R, Phys. Sc. Hon. Prereq.	II or III

TABLE I. (CONTINUED)

Dev. of West. Civilization	3	R	III or IV
Dev. of East. Civilization	3	R	III or IV
For Lang. Hon. I	4	O	I, II, III or IV
For Lang. Hon. II	4	O (F. L. Hon. I Prereq.)	"
Domain of the Arts	3	R	III or IV
Man and his Physical Environment	3	O (Phys. Sc. Hon. Prereq.)	III or IV
Summer Reading	V		
Preceding So. Yr.	1-3*	O	As defined
" Jr. Yr.	1-3*	O	"
" Sr. Yr.	1-3*	O	"
*Honors Hours depending on merit (credit to be determined by dept.)			
Soph. Comprehensive Exam	2-3*	R	II
*Honors Hours depending on merit (credit to be determined by dept.)			
Senior Comprehensive Exam	.....	R	IV
Senior Thesis or Project	2-4*	O	IV
*Special Problems credit (credit to be determined by dept.)			

Each Department or School Will Set Its Own Particular Additional Requirements for Its Honors Students.

CAN PHARMACY PARTICIPATE IN AN HONORS PROGRAM?

V. N. BHATIA

The Honors Program recently adopted at Washington State University differs from most of the other honors programs across the country in one important aspect. Whereas most programs of this type are designed only for the superior students in the liberal arts, the Honors Program at Washington State is a true university-wide program which permits participation by students in the professional schools. In fact, some of the most enthusiastic support for the formulation and implementation of the Program came from the faculties of the professional schools. On the other hand, it is also interesting to note that the Honors Council (the committee that formulated the program), though made up largely of faculty members from several liberal arts departments, never assumed for a moment that the program should be restricted to any one group of superior students.

From the time that the Honors Program was first considered by the faculty of the School of Pharmacy, there was no question of our participation in it. The question that had to be resolved was how our crowded curriculum could be modified to enable our superior students to participate in the Program. In its deliberations the faculty was guided by three basic beliefs: (1) We should be willing to modify the curriculum for our superior students so as to enable them to acquire a richer education. (2) Such modifications could be made without shortchanging the student's professional learning. (3) Although participation in the program would result in the students taking some course "overloads," this was not a serious handicap since only superior students who could be expected to handle some "overloads" would be involved.

It was also recognized that there were two facets to the adoption of such a program: (1) The changes in the curriculum such as the inclusion of the honors courses and the rearrangement of the regular courses, (2) changes in the course content of some of the regular courses to make them more challenging to the honor students.

That the first of these facets or requirements could be satisfied for our curriculum can be seen by the following listing of the Schedule of Studies for both the regular and the honors curricula:

SCHEDULE OF STUDIES
REGULAR PROGRAM
PREPHARMACY YEAR

First Semester		Second Semester	
Course	**Cr. Hrs.**	**Course**	**Cr. Hrs.**
General Chemistry	4	General Chemistry	4
English Composition	3	English Composition	3
Algebra & Trigonometry	5	Introductory Zoology	3
Hum. or Soc. S. Elective	3	Hum. or Soc. S. Elective	3
Mil. or Air Science	2	Mil. or Air Science	2
P. E.	½	P. E.	½
	17½		15½

FIRST PROFESSIONAL YEAR

Pharmacy Orientation	1	Phar. Arithmetic	2
Organic Chemistry	5	Organic Chemistry	5
General Physics	4	General Physics	4
Quantitative Analysis	4	Introductory Botany	3
Mil. or Air Science	2	Mil. or Air Science	2
P. E.	½	P. E.	½
	16½		16½

SECOND PROFESSIONAL YEAR

Beginning Pharmacy	4	Beginning Manufacturing	3
Beginning Pharmacognosy	5	Pharmacognosy	3
Biochemistry	4	Elementary Bacteriology	4
Principles of Zoophys.	4	Principles of Econ.	4
	17	Principles of Zoophys.	4
			18

THIRD PROFESSIONAL YEAR

Pharmacol. & Therapeut.	4	Pharmacol. & Therapeut.	3
Organic Phar. Chemistry	3	Organic Phar. Chemistry	3
Organic Phar. Analysis	3	Assay	3
Inorganic Phar. Chemistry	2	Physical Pharmacy	3
Soc. S., Hum., or approved		Pharmacy Law	3
elective	3	Hist. & Ethics of Phar.	2
	15		17

FOURTH PROFESSIONAL YEAR

Prin. of Accounting	4	Dispensing	4
Dispensing	4	Prescription Specialties	2
Prescription Specialties	2	Management	3
Pharmacy Seminar	2	Elective	7
Elective	5		
	17		16

TENTATIVE SCHEDULE OF STUDIES
HONORS PROGRAM

(All honors courses are shown in *italics*)

PREPHARMACY YEAR

First Semester		Second Semester	
Course	**Cr. Hrs.**	**Course**	**Cr. Hrs.**
General Chemistry	4	General Chemistry	4
English Honors I	3	*English Honors II*	3
Mathematics Honors I	3	Introductory Zoology	3
Introductory Botany	3	*Mathematics Honors II*	3
Mil. or Air Science	2	Mil. or Air Science	2
P. E.	½	P. E.	½
Univ. Readings & Lectures	0	*Univ. Readings & Lectures*	0
	15½		15½

FIRST PROFESSIONAL YEAR

Foreign Lang. Honors I	4	*Foreign Lang. Honors II*	4
Organic Chemistry	5	Organic Chemistry	5
General Physics	4	General Physics	4
Quantitative Analysis	4	*Social Science Honors*	3
Mil. or Air Science	2	Mil. or Air Science	2
P. E.	½	P. E.	½
	19½		18½

SECOND PROFESSIONAL YEAR[1]

Beginning Pharmacy	4	Beginning Manufacturing	3
Beginning Pharmacognosy	3	Pharmacognosy	3
Biochemistry	4	Elementary Bacteriology	4
Principles of Zoophys.	4	*Economics Honors*	3
Pharmacy Orientation	1	Principles of Zoophys.	4
	18		17

Sophomore Comprehensive Exam

THIRD PROFESSIONAL YEAR[2]

Pharmacol. & Therapeut.	4	Pharmacol. & Therapeut.	3
Organic Phar. Chemistry	3	Organic Phar. Chemistry	3
Organic Phar. Analysis	3	Assay	3
Inorganic Phar. Chemistry	2	Physical Pharmacy	3
Dev. of Western Civilization	3	Pharmacy Law	3
Elective	2	Elective	2
	17		17

FOURTH PROFESSIONAL YEAR[3]

Prin. of Accounting	4	Dispensing	4
Dispensing	4	Prescription Specialties	2
Prescription Specialties	2	Management	3
Dev. of Eastern Civ.	3	*Domain of the Arts*	3
Elective	4	Elective	2
		Thesis	2
	17		16

Senior Comprehensive Exam.

NOTES

1. Summer reading at the end of Second Professional Year to consist in part of readings about specialized fields, e.g., Hospital Pharmacy, Pharmaceutical Education, etc.
2. Summer reading at the end of the Third Professional Year to cover History and Ethics (pharmaceutical).
3. Student to be given opportunity to participate in the graduate departmental seminar instead of taking the senior seminar.

The second facet or requirement, changes in the course content of some of the regular courses, would have to be developed gradually by individual instructors following the implementation of the program. It is likely that considerable experimentation may be necessary in order to evolve a method for upgrading any given course.

Possibly it might be easier to attempt such changes first in elective courses because usually such courses have lower enrollments which would make experimentation easier. Also, in case any reorganized course does not prove too successful the first time or so, the basic pattern of the student's professional education would not be altered.

As an example of the type of changes that might be made in elective as well as in required courses, let us consider the courses in Industrial Pharmacy (elective) and Pharmaceutical Assay (required) at Washington State. The course in Industrial Pharmacy is open to students who have completed the required courses in Beginning Manufacturing Pharmacy and Physical Pharmacy. Students taking this course are already familiar with the more descriptive aspects of manufacturing pharmacy and have made elementary laboratory preparations. The work in the Industrial Pharmacy course consists of detailed study of manufacturing processes and laboratory exercises involving more complex preparations made under simulated manufacturing conditions.

For students in the Honors Program it would be possible to substitute and supplement some of the lecture material by individual library research in depth, in selected areas, together with conferences to guide and coordinate the student efforts. The laboratory work could be handled by a "problem approach," e.g., a student would be given a chemical from which to develop a variety of dosage forms in the course of the semester. He would be expected first to develop a plan for tackling his "problem" and after it has been approved would be permitted to work in the laboratory under proper guidance.

In the course in Pharmaceutical Assay, the student in the Honors Program would be given corresponding opportunities to explore existing knowledge in the field. He would be encouraged to view physical and chemical concepts and principles critically with reference to their accepted places in the armamentarium of the analyst, and to design experiments whereby they may be tested. He would be encouraged, furthermore, to penetrate beyond the realm of generally recognized methodology in pharmaceutical and chemical analysis and to seek a deeper familiarity with the theoretical bases for evaluating and integrating data. This may be accomplished through concentrated study and experimentation, and may involve any one of several useful and adaptable instrumental, chemical, and physical procedures employed in modern analysis.

In conclusion it must be pointed out that the changes in the curriculum and courses discussed here are but one part of the work of implementing an honors program. Another important aspect of any such program is the development of an atmosphere conducive to the objectives of honors work. One must not overlook the fact that an honors program and honors students require more work and effort from the faculty. Therefore, unless the faculty is motivated in this direction and strongly feels that the extra effort is worthwhile, the results will be disappointing, and the students will have been shortchanged rather than academically enriched.

Some time ago I heard a college teacher say that he simply could not understand why students no longer flocked to his classes as they had done twenty years before when he was giving exactly the same lectures.

Lloyd E. Blauch, Am. J. Pharm. Ed., 13, 460 (1949)

ARTICLES

THE STATUS AND POTENTIAL OF THE COURSE IN COSMETIC SCIENCE

RICHARD E. FAUST

I should like to discuss some phases of the course in cosmetics as presented in the pharmacy curriculum today and also to comment on what I feel is a challenging interrelationship between pharmacy, dermatology, and cosmetic science.

We know that pharmacy, like all professions, is changing and that pharmaceutical education should recognize and keep pace with this change. We know that the average retail pharmacist practices the art of his profession much differently than did his predecessor a few decades ago, for the compounding skills are found today essentially in pharmaceutical plants. For the young pharmacy graduate who wishes to practice *actively* the many skills and talents mastered during his long training, there are numerous opportunities, of course, in the laboratories of these pharmaceutical firms.

But there is another outstanding area of opportunity represented by the cosmetic industry—with over 700 companies and annual sales rapidly approaching two billion dollars. And, furthermore, this industry needs research workers and technicians with exactly the background that pharmacy provides. It has been emphasized by leaders of the cosmetic industry that few collegiate programs other than pharmacy provide the diverse training in the physical, chemical, and biological sciences coupled with the special training in compounding techniques so necessary to the development of new and improved cosmetic and toiletry products.

The bases and vehicles used in preparing pharmaceutical lotions, ointments, powders, soaps, and other topical forms are essentially similar to related cosmetic products. The same knowledge and skill required, for example, to formulate a suitable lotion containing a potent steroid is used in developing a simple non-medicated cosmetic hand lotion.

There are many reasons why we in pharmaceutical education should take a greater interest in the cosmetic industry. I shall have time to mention only a few of the more important ones. For example, we find more and more pharmaceutical firms entering the field of cosmetics, through merger, affiliation, or acquisition of other companies, or through the formation of new marketing divisions within their own organizations.

Secondly, the line of demarcation between cosmetics, proprietary drugs, and prescription products is sometimes vague or illusive; and the advent of the so-called medicated cosmetics containing antiseptics, hormones, vitamins, etc., further complicates this picture. Legislation is now pending in Congress to require the pre-testing of cosmetics before they are marketed to assure their safety. If such legislation becomes a reality, then the cosmetic industry will need many more highly skilled personnel for the formulation, screening, and

* Presented to the A.Ph.A. Section on Education and Legislation, Cincinnati, Ohio, 1959.

evaluation of new products. The pharmacist can meet these responsibilities admirably.

And, lastly, pharmaceutical educators should be aware that the cosmetic industry is a source of funds for the creation of research programs within the college. Many cosmetic and toiletry companies are beginning to realize that the graduate student in pharmacy is ideally suited to carry out research projects in the area of cosmetics.

In order to evaluate the opportunities for pharmacists within the cosmetic industry, questionnaires were sent to twenty-five prominent companies. Twelve completed and one partially completed questionnaires were returned. Now, although this sampling is rather small, and perhaps not statistically representative in all details, it does give us a general trend of thought that is encouraging and provocative.

There were four questions in the survey, as follows:

1. *Approximately how many pharmacists do you now have on your research, product control, production, sales, and other staffs?*

   Ans. Eight firms noted that they employed from one to five pharmacists. This is indicative, I feel, that there is already a sizeable number of pharmacists employed by this industry and that opportunities *do* exist here.

2. *Would you consider hiring a pharmacist with a Bachelor's Degree if he has had a special course in cosmetic chemistry or cosmetic technology?*

   Ans. All twelve companies noted that they would consider employing such an individual. This unanimous response needs no comment, except to say that it confirms the rationale which prompted this paper.

3. *Where do you think the pharmacist would best fit into your organization?*

   Ans. Six areas were listed: research, control, production, administrative, sales, and marketing. The replies were as follows: Research — twelve, Control — seven, Production — four, Administrative — one, and Sales and Marketing none. From these answers it is apparent that opportunities are greatest in product research and control areas.

4. *What are your general comments concerning the opportunities for pharmacists in your company?*

   Ans. Many interesting answers were received, but the following one is representative: "Our product and control staff consists of four graduate chemists. Graduates in chemistry or pharmacy are equally acceptable for those beginning their professional career in cosmetics. A course in cosmetic chemistry or technology is a definite plus for such a candidate. In my opinion such a course belongs in the pharmacy curriculum. . . ."

This brief survey seems to point out the need for a special course in cosmetics in the pharmacy curriculum. Now, what is the status of the program in cosmetics in the various pharmacy schools and colleges? How do we stand today? If we examine the curricula of the accredited institutions, we find that twenty-eight, or over one-third, offer a course in cosmetics or closely related area. Some of

these programs are restricted to the graduate level, but the majority are presented on an elective basis to senior undergraduates. Nearly all of them are given with a laboratory and credit for the entire course averages two to three semester hours.

There is considerable diversity in course titles. They include: Cosmetic Formulation, Cosmetic and Toilet Preparations, Cosmetology, Dermatological and Cosmetic Preparations, or simply Cosmetics. Any such designation would perhaps be suitable, except possibly Cosmetology, which refers to the art or practice of performing cosmetic operations or giving cosmetic treatments, certainly not a description of the academic area we are discussing here.

Any introduction to the course in cosmetics should stress the broad relationships between pharmacy, dermatology, and cosmetic science. In addition to a brief historical sketch emphasizing the remarkable growth of the cosmetic industry and noting current trends, the principal journals, texts, and organizations of interest to the dermatologist and cosmetic chemist should be mentioned. The challenging opportunities for rewarding careers in the research and control laboratories of the cosmetic industry should also be discussed.

Because of the importance of the skin to any study of topical preparations, the anatomy and physiology of this organ should be carefully reviewed at the beginning of the course, together with such associated topics as skin aging, skin penetration, perspiration, pigmentation, the effect of medicaments on the skin, etc.

The main body of course material can be divided and studied as general classes based on a physical characterization, such as powders, creams, ointments, lotions, liquids, pastes, etc. Or, one can present the material by dividing cosmetics into natural specific categories, such as shampoos, shaving creams, mouthwashes, lipstick, nail lacquers, rouge, etc., or into groups of specially related preparations, such as hair-grooming products, baby toiletries, shaving preparations, etc.

However, with the emergence of the pharmacist as consultant to the physician and the parallel prominence of pharmacology, it would seem appropriate to study the various *components* of topical preparations by emphasizing their physiological and mechanical effect on the skin. By this, I refer to the classification of cosmetic components into groups such as antipruritics, emollients, astringents, antiperspirants, cleansing agents, etc. Appropriate formulae containing these various agents can be examined concurrently and also prepared in the laboratory.

Of course, other important constituents of cosmetic products should also be studied, such as emulsifying agents, preservatives, humectants, colorants, and perfumes. These are certainly an important aspect of the subject.

Other phases of the course could emphasize manufacturing procedures, stability testing and evaluation of formulations, packaging materials, clinical evaluation of new products, and even consumer testing. Visiting lecturers, such as dermatologists, perfumers, or cosmetic chemists from nearby plants will enhance interest in the course and class trips to these plants will contribute to the effective presentation of the program.

In summary, then, we can say that with the increasing complexity and growth of the cosmetic industry, the need for trained specialists and research workers is increasing. Few collegiate programs other than pharmacy provide the broad

academic background essential for successful product research and development in the cosmetic area.

A survey of thirteen leading cosmetic manufacturers reveals challenging opportunities for graduate pharmacists, especially if they have had a course in cosmetics.

The program in cosmetics has gradually become an important unit of the elective offerings in over one-third of the schools of pharmacy, but it is suggested that the scope of these courses be expanded and that other schools consider the establishment of such programs. Students who complete these programs and find positions in the laboratories of the cosmetic industry, will be able to use skills they have developed in pharmacy school and can give to the "art of pharmacy" new dimension and new direction.

Because of the publicized shortage of pharmacists, we may hear objections that pharmacy graduates should be trained for retail pharmacy and encouraged to stay within the narrow area of retail pharmacy. Now, in addition to the fact that the course in cosmetics *can* be of value to the retail pharmacist, I submit that many graduates from our schools wish to practice actively the special skills and principles mastered in such courses as pharmacology, bacteriology, and chemistry, as well as the pharmacy courses per se.

We should realize that, in addition to the laboratories of the pharmaceutical houses, these graduates can utilize their professional skills in the formulation and manufacture of quality cosmetic preparations. We should realize, further, that if we encourage young pharmacists to accept responsible positions in research centers, government public health organizations, hospitals, as well as related professional areas, such as cosmetics, we shall in time increase the prestige and influence of the pharmacist in our complex society.

One who is a pharmacist by training will undoubtedly carry his loyalty to the profession to *whatever* position he may eventually hold in a related vocation. By his efforts and successes he is certain to benefit the profession and enhance the stature of the pharmacist.

The prevailing salary scales for the teachers of professional subjects, in the majority of cases are entirely too low to attract and to afford a satisfactory career for men of superior ability and to meet the competition from industry. . . . Pharmaceutical education is stalemated by the inadequate compensation of those who teach.

Lloyd E. Blauch, Am. J. Pharm. Ed., 13, 458 (1949)

FOUR YEARS OF EXPERIENCE WITH A POST-GRADUATE GUIDANCE PROGRAM AT THE BROOKLYN COLLEGE OF PHARMACY*

ISIDORE GREENBERG AND ARTHUR G. ZUPKO

During the post World War II period the phenomenal growth of the pharmaceutical industry, particularly manufacturing, continued at an unprecedented rate. This growth, as you no doubt are aware, is still going on and the end is nowhere in sight. An important by-product of this startling growth was the expanded employment opportunities for pharmacy graduates other than in retailing. Students, particularly seniors to whom the formulation of postgraduate plans were of more moment, became aware of such employment opportunities. Being only imperfectly informed of the requirements and opportunities in employment other than retailing they naturally sought the advice and counsel of their professors.

Such was the situation at our college in the late 1940's. Students were making frequent inquiries of faculty members regarding employment opportunities in industry, particularly detailing. This was of special interest, since our college had traditionally emphasized the preparation of pharmacists for retail practice. It was proposed, therefore, to take an informal survey of the senior students to see if there were any important changes in student attitudes. In September, 1950, 136 senior students were given a simple questionnaire. In addition to some personal information, they were asked to state what would be their preference for professional activity following graduation. The results, shown in Table I, showed that postgraduate plans were still overwhelmingly in favor of retailing. At best, probably only slightly less than what had been the case previously. Retailing was selected by 82.7 per cent of the students. The remaining 17.3 per cent were divided among wholesaling, manufacturing, detailing and selling, graduate study and research, civil service, and medical school. In

TABLE I. PROFESSIONAL OBJECTIVES OF 136 SENIOR STUDENTS AT THE BROOKLYN COLLEGE OF PHARMACY, 1950

Area	Number	Per cent[1]
Retailing	117	82.7
Wholesaling	1	0.7
Manufacturing	4	2.7
Detailing & Selling	7	4.9
Hospital Pharmacy	4	2.7
Graduate Study & Research	6	4.2
Civil Service	1	0.7
Medical School	1	0.7
Undecided	1	0.7
Total	142[2]	100.0

[1] Per cents are based on 142.

[2] This exceeds the number of students, 136, owing to the fact that in a number of cases there was more than one choice.

* Presented to the A.Ph.A. Section on Education and Legislation, Cincinnati, Ohio, 1959.

view of this picture it was felt that no specific action was, as yet, indicated on the part of the faculty for some specific program; however, it was considered advisable to watch the matter closely. Accordingly it was decided to take similar annual surveys to see what trends would develop.

This was done, and by 1955 the situation had materially changed, as shown in Table II. The percentage who elected retailing as a first choice had dropped from 82.7 to 51.0. In addition, many more areas had been selected, the more prominent ones being: graduate study and research, detailing and selling, manufacturing, and hospital pharmacy. Since this trend, away from retailing and toward other areas related to pharmacy, was already sharply in evidence during the intervening years between 1950 and 1955, it was decided to make a formal proposal to the administration (prior informal discussions having been had among some of the faculty members and with the administration) to set up some machinery to take advantage of the faculty's superior experience and knowledge to help students make the best possible decisions in planning their future careers.

To set the groundwork the matter was first proposed to the curriculum committee, the committee which was at that time considering broad faculty policy changes, for consideration and discussion in June, 1954. The concept of the establishment of some sort of guidance committee to help students with their postgraduate plans was accepted in principle. In the discussion that ensued it was brought out that undergraduate ambitions might correlate poorly with postgraduate actualities and that, therefore, a survey should be made of recent graduates to ascertain just what pharmaceutical activity they were currently engaged in. It was further suggested that a list of the functions and duties of such a guidance committee be drawn up. Pending the completion of these two matters formal presentation to the faculty for approval would be deferred.

TABLE II. PROFESSIONAL OBJECTIVES OF 106 SENIOR STUDENTS AT THE BROOKLYN COLLEGE OF PHARMACY, 1955

Area	1st Choice		2nd Choice		3rd Choice	
	Number	Per cent[1]	Number	Per cent	Number	Per cent
Retailing	54	51.0	16	15.1	22	20.8
Wholesaling	0	0.0	4	3.8	2	1.9
Manufacturing	6	5.7	9	8.5	10	9.4
Detailing & Selling	7	6.6	26	24.5	7	6.6
Hospital Pharmacy	3	2.8	5	4.7	8	7.5
Graduate Study & Research	17	16.0	14	13.2	10	9.4
Civil Service	4	3.8	1	0.9	4	3.8
Pharmacology	1	0.9	0	0.0	0	0.0
Teaching	1	0.9	1	0.9	3	2.8
Dental School	3	2.8	1	0.9	1	0.9
Medical School	4	3.8	7	6.6	1	0.9
Veterinary	0	0.0	0	0.0	0	0.0
Law	1	0.9	1	0.9	0	0.0
Chain Store	0	0.0	1	0.9	0	0.0
Osteopathy	1	0.9	2	1.9	0	0.0
Public Health	0	0.0	4	3.8	7	6.6
Totals[2]	102	96.1	92	86.6	75	64.0

[1] Per cents given are based upon the total number of students answering the questionnaire, 106.

[2] Totals are based on the actual responses. Some cases indicated no choices at all; in other cases only a first and second choice was indicated.

Due to the intervening summer vacation and the usual activities at the start of the fall semester the survey did not get under way until about October of 1954. A total of 366 questionnaires was sent out as follows:

Class of 1952 — 119
Class of 1953 — 128
Class of 1954 — 119

One hundred and seventeen replies were obtained for the three years, constituting 32 per cent of the total. The breakdown by classes was as follows:

Class	Responses	Per cent
1952	40	33.7
1953	35	27.3
1954	42	35.3

Details of the responses for the three classes are shown in Table III.

While not as high as was hoped, the number of responses, percentagewise, was greater than that usually obtained from mail questionnaires; therefore, some degree of reliance was placed on the results.

Table III shows, as was expected, that the majority of students do gravitate to retail pharmacy, on the overall 65.6 per cent, a figure that is quite in line with the expressed intentions in the surveys during the senior year. A fair percentage of students, however, do pursue and find employment in areas other than retailing, and the diversity of types is as great as those expressed in the surveys while seniors. Among the areas are: wholesaling, manufacturing, detailing, research, teaching, advertising, other professions, graduate study, and civil service. In the case of graduate study the fields are: pharmacology, pharmaceutical manufacturing, pharmaceutical chemistry, product development and research, and osteopathy. The degrees sought are both masters and doctors, and the schools attended are widespread.

During the period in which the survey was being conducted and tabulated a list of the functions of the proposed guidance committee was drawn up. Included, were the following:

1. Annual surveys of senior students should be taken to ascertain their postgraduate career objectives. If necessary, this may be extended to other classes.
2. Other appropriate studies should be carried on among the students whenever the need may arise.
3. Accumulate and build a library of information of career opportunities for other professions, graduate study, fellowships, scholarships, etc., so as to be able to give students the best possible advice.
4. Exploit the knowledge and experience of the faculty or other experts in the field of pharmacy.
5. Devise procedures and forms as an aid in processing students' applications and letters of recommendation for postgraduate study or employment.
6. Cooperate closely with other college committees, especially the Advisory Committee and the Committee on Course and Standing.

The results of this special survey and the list of functions were submitted for consideration by the Curriculum Committee. In the ensuing discussion it was pointed out, and the committee agreed, that while the sample was small and

TABLE III. PROFESSIONAL ACTIVITIES OF RECENT GRADUATES OF BROOKLYN COLLEGE OF PHARMACY

Year of Graduation	**1952**		**1953**		**1954**	
Number of Graduates	119		128		119	
Number Responding	40	(33.7)[1]	35	(27.3)	42	(35.3)
Present Employment:						
Retail Pharmacy Owner	8	(20.0)	3	(8.6)	2	(4.8)
Retail Pharmacy Employee:						
Manager	2		3		1	
Assistant Manager	0		3		3	
Clerk, Registered	19		8		16	
Clerk, Junior	0		0		0	
Total	21	(52.5)	14	(40.0)	20	(48.0)
Type of Establishment:						
Independent	12		9		18	
Chain	1		1		2	
Unspecified	8		4		8	
Total	21		14		28	
Other Employment:						
Wholesale Drugs	0		1		1	
Pharm. Manufacturing	5		0		1	
Detailing	2		1		0	
Hospital Pharmacy	1		3		1	
Military Service	1		13		9	
Graduate Study	4		2		3	
Total	13	(32.5)	20	(57.2)	15	(36.7)
Career Objectives: (Non-owners)						
Retail Pharmacy Owner	17		19		17	
Wholesaling	0		1		0	
Manufacturing	2		3		2	
Detailing	0		1		1	
Research	3		1		2	
Teaching	1		0		0	
Advance in Firm	2		0		0	
Advertising	0		0		1	
Study Other Profession	0		1		0	
Civil Service	0		0		1	
Establish a Chain	0		0		1	
Undecided	1		0		4	
Unspecified	6		6		11	
Total	32		32		40	

[1] Figures in parentheses are per cents of respondents.

NOTE: Types of positions held include: (a) Wholesaling—charge of new products and inventory of proprietaries; (b) Manufacturing—supervisor, pharmacist-in-charge, general manager, and pharmaceutical chemist; (c) One hospital pharmacist was in military service.

undoubtedly statistically biased, the results have a high degree of validity because of the close correlation with expressions prior to graduation. The report of the survey and the list of functions were accepted and it was unanimously approved that a formal presentation be made to the faculty for its approval for the creation of a guidance committee.

This was done. The proposal was well received by the faculty. The formal creation of the committee, by action of the Dean, took place in November of 1955, with one important change. Instead of appointing a small committee, the Dean appointed the entire faculty as a committee with the chairman acting as coordinator. This had the effect of placing a degree of responsibility and awareness on all faculty members for student guidance.

Immediately following the Dean's action the chairman began to set up the procedures and policies necessary. The faculty was requested to fill out a questionnaire indicating those areas in which they were most proficient to offer guidance. These replies were kept on file by the chairman and enabled him to refer students to the faculty member who would most likely be able to help him. The student body was informed of the creation of the committee, its functions and utilities, by mimeographed announcements, postings on the bulletin boards, and appropriate sections in the College catalog and the student handbook. The chairman also began to collect a library of useful information, both in his office and in the College library.

The library of information, begun at that time, has grown quite extensively. It includes catalogs of all colleges of pharmacy, particularly those offering graduate courses of study, and of many universities and professional colleges; descriptive brochures and pamphlets from federal departments employing pharmacists, e.g., Public Health Service, Food and Drug Administration, Veterans Administration, Civil Service Commission, etc., as well as state and local departments; publications describing employment opportunities in pharmaceutical industry distributed by the various companies; and, reprints of articles and papers appearing in the pharmaceutical press, e.g., Rudolph H. Blythe, "Opportunities for Pharmacists in Industry," *J.A.Ph.A., Practical Ed.* Vol. 19 (No. 6) June, 1958; and, Rudolph H. Blythe, "The Demand for Pharmacy-Trained Ph.D.'s in Industry," *American Journal of Pharmaceutical Education,* Vol 21 (No. 4) 1957; and, of course, *The Health Careers Handbook* published by the National Health Council.

In the four years since its creation, the number of requests for information amply justify its existence. Over 200 student contacts were made of a formal nature and for which records were kept. Details of this may be seen in Table IV. An average of about fifty students each year contacted the chairman of the committee. Requests ranged for information about opportunities in manufacturing, hospital pharmacy, detailing, selling, and chain stores; other professions including: dentistry, medicine, osteopathy, veterinary medicine, and podiatry; graduate study included such diverse areas as: pharmaceutical chemistry, protozoology and parasitology, manufacturing pharmacy and formulation, pharmacology, hospital pharmacy, business and pharmacy administration, library science, biochemistry, and microbiology; and, finally, teaching and civil service. This, of course, is apart from the great many informal inquiries made of the chairman as well as many other faculty members, not only by the seniors but by the lower classmen also. Many of these informal inquiries relate to the various aspects of retailing, an area in which greater caution must be exercised

TABLE IV. TYPES AND FREQUENCY OF GUIDANCE INFORMATION REQUESTS BY SENIORS AT BROOKLYN COLLEGE OF PHARMACY, 1955-1959

Area	1955	1956	1957	1958
Manufacturing	1	1	0	2
Hospital Pharmacy	2	5	4	6
Detailing	6	1	5	4
Selling—Foreign	1	0	0	0
Chain Store	0	0	1	3
Dentistry	6	1	2	3
Medicine	10	9	9	3
Osteopathy	5	11	17	5
Veterinary Medicine	0	1	0	0
Podiatry	0	1	0	0
Teaching	3	2	1	0
Civil Service	1	1	1	4
Graduate Study:				
Pharmaceutical Chemistry	5	5	1	4
Manufacturing Pharmacy	5	10	5	3
Pharmacology	3	7	4	6
Hospital Pharmacy	1	0	0	0
Protozoology & Parasitology	1	0	0	0
Business & Pharmacy Administration	1	6	1	2
Library Science	0	0	1	0
Biochemistry	0	0	1	0
Microbiology	0	0	0	1
Total	51	61	53	46

Note: The number of senior students in each year averages about 120.

owing to the fact that retail units are larger and require a greater investment than formerly. Parenthetically, when the seniors or juniors go on a field trip to one of the pharmaceutical companies a session is always arranged at which employment opportunities with that company are discussed and questions answered.

An aspect of considerable importance, and one which should not be overlooked, is the matter of curricular adjustment, both as to course content as well as electives. Traditional courses are not always adequate to prepare students for postgraduate study, especially in certain areas. It becomes the duty of the college to offer students satisfactory preparation for such graduate study. This can be done by means of the adjustment of the content of existing courses and the offering of certain electives. This, of course, would be much easier for a college of pharmacy with a university affiliation but not insurmountable for one without. Another matter of concern is that of planning, especially on the part of the student. The student will have to anticipate his postgraduate intentions sufficiently in advance so as to get in the proper electives. This in turn will entail more informed and careful guidance.

In summation: The changing patterns of postgraduate activities of pharmacy students have been amply demonstrated as a result of in-college surveys. This was confirmed by an out-of-college survey of recent graduates. The diversity of occupations sought indicates that there is a need for the establishment of a guidance committee. Four years of operation of such a guidance committee has amply demonstrated its usefulness.

TRENDS IN HOSPITAL PHARMACY EDUCATION

ELMER M. PLEIN

Formal hospital pharmacy education is relatively young. In 1927 Harvey A. K. Whitney established at the University of Michigan the first hospital pharmacy internship program. In 1932 Dean Edward Spease (1) wrote that he thought it strange schools of pharmacy were not associated with hospitals. He also stressed the importance of training the hospital pharmacist intern along with the medical intern and the nurse. In about 1937 Dean Spease established at Western Reserve University School of Pharmacy the first combination of pharmacy internship and graduate study (2). The success of the program was illustrated by the fact that in 1940 Dean Spease had thirteen graduate students in hospital pharmacy (3).

Upon the request of Dr. Malcolm MacEachern of the American College of Surgeons the first minimum standard for hospital pharmacy was written by Dean Spease (4, 5). In this minimum standard it was stated that the pharmacist shall have immediate supervision over the preparation of injectables; the manufacture of pharmaceuticals; the dispensing of drugs, chemicals, and pharmaceuticals; the filling and labeling of all containers issued to nursing units; inspection of pharmacy supplies on nursing units; maintenance of an approved stock of antidotes in an emergency kit; dispensing of all narcotics; specifications for the purchase of all drugs, chemicals and pharmaceutical products, and biologicals; and all operations wherein a special knowledge of pharmacy is necessary. In addition to these responsibilities, the Minimum Standard for Pharmacies in Hospitals now (6) includes furnishing information concerning medications to physicians, interns, and nurses; the establishment and maintenance, in cooperation with the accounting department, of a system of records and bookkeeping for (a) charging patients for drugs and pharmaceutical supplies and (b) maintaining adequate control over the requisitioning and dispensing of all drugs and pharmaceutical supplies; planning, organizing and directing pharmacy policies and procedures; maintenance of the department; cooperation in teaching courses in the school of nursing and in the medical intern training program; implementing the decisions of the pharmacy and therapeutics committee; and the preparation of periodic reports on the progress of the department for the administrator of the hospital.

An examination of these responsibilities and a consideration of the location of his activities and his clientele are sufficient to remind one that the hospital pharmacist is the most highly specialized of all pharmacists. His education, therefore, should be geared to give him the training adequate for the position he is to fill.

At the present time hospital pharmacists are educated by three different procedures (7); (a) by taking the same undergraduate training the other pharmacy students follow with possible use of specialized elective courses and then obtaining a position in a hospital pharmacy where they learn on the job; (b) by following the usual undergraduate curriculum with a master's program of specialized nature; and (c) by combining either of the two above-mentioned procedures with a formal internship or residency in hospital pharmacy. It

should be pointed out that there are excellent hospital pharmacists practicing who have completed their training by each of these methods.

Let us consider these procedures and combinations of them and point out the current trends in hospital pharmacy education. Data, some of which has been presented (8), concerning courses in hospital pharmacy, internships and requirements for graduate degrees were determined from a questionnaire submitted to each of the seventy-five schools of pharmacy in the states. The response was excellent with 100 per cent return of completed questionnaires and the answers reflected recent additions, changes, and future plans for hospital pharmacy education.

Fifty-six of the seventy-five schools offer courses in hospital pharmacy at the undergraduate or graduate level. Seven of the schools with graduate programs in hospital pharmacy make no provision for undergraduate courses in the subject. Thirty-five of the forty-nine schools which teach undergraduate hospital pharmacy offer one course in hospital pharmacy to undergraduates, eleven offer two undergraduate courses, and one offers as many as four courses.

The undergraduate courses are probably used in most schools to introduce hospital pharmacy to the students, although in some schools the courses are designed for graduate students as well as for undergraduates. Thirty-one schools give laboratory instruction as part of the course. Where the school has a health center and/or teaching hospital, these facilities are used for teaching purposes. However, non-university hospitals cooperate with the schools and the hospital pharmacists serve as preceptors in teaching the laboratory portion of the course. Twelve schools reported such cooperation. The University of Washington finds this procedure to function very well, and even though the school now has a teaching hospital in which to give laboratory instruction, the plan is to continue to use the non-university hospitals as well and to rotate the students among several hospitals to widen their experiences.

The report of the Committee on Hospital Pharmacy Education of the American Association of Colleges of Pharmacy (9) presented at the 1957 meetings of that group contains some interesting facts relative to courses in hospital pharmacy. The Committee agreed that all courses required in the five year program are probably needed for every field of pharmacy and certainly for hospital pharmacy. The committee, assuming that there would be provision for professional electives in the last two years of the five year program, suggested work beyond the required courses to help qualify students to enter the field of hospital pharmacy. Manufacturing pharmacy, three credits per semester for two semesters; hospital pharmacy management, two credits; and hospital pharmacy seminar, two credits were suggested.

In addition to the preparation of dosage forms in large quantity in the course in manufacturing pharmacy, the Committee felt that the manufacture of sterile solutions, ophthalmic preparations, allergenic extracts, and laboratory reagents should be emphasized. Hospital pharmacy management could be taught after Herbert Flack's syllabus (10). In hospital pharmacy seminar the students would present papers based on library research, which procedure would be designed to give the students as broad a picture of the operation of a hospital pharmacy as possible.

The Committee thought a course in public health would be of particular value in stressing the position of pharmacy in relation to the other health sciences. It was recommended that those schools having the facilities should teach a course in radioisotopes. The final point brought out by the Committee was that pharmacy students should be given instruction in medical terminology, perhaps through introductions to derivations of words, early in the curriculum.

The Committee felt that the courses in hospital pharmacy suggested in its report would aid appreciably in meeting the critical manpower shortage in this field, particularly because the number of students receiving the master's degree with a major in hospital pharmacy will not meet the demands in the near future. It was thought also that these courses in hospital pharmacy will interest more students in the field, and, that having been introduced to it on an undergraduate basis, more of them will decide to go on in graduate work.

Let us consider some of the educational programs leading to a graduate degree in hospital pharmacy. In Table I are listed the schools offering graduate courses in hospital pharmacy. With the schools are listed the hospitals offering academic internships in hospital pharmacy and associated with the schools in the educational programs. Most of the data in this table were also obtained from the questionnaire. In the second column are listed the graduate courses in hospital pharmacy and the credit each carries. Some of the courses listed may not be considered as hospital pharmacy, and some of them definitely not in a strict sense, but they were taken directly from the questionnaire as presented. No attempt was made at this time to study the remainder of the curriculum leading to the master's degree at each school. Twenty-one schools require a thesis for the master's degree, and eight of them require a reading knowledge of a foreign language.

Some schools will accept a special project in lieu of a thesis, so the question was asked about this problem with respect to hospital pharmacy. From the data it appears that special projects are not used particularly for this purpose. The projects described in the questionnaires returned concerned library research problems, surveys, formulation, sterilization, and stabilization of products. Many schools require special projects in addition to a thesis.

Most of the schools require an internship program for the master's degree and the last column of Table I presents the clock hours of the required programs. Although the present requirement is 2000 hours, some schools have reported 1920 hours, which was formerly the requirement.

A Schema for Hospital Pharmacy Internships was presented at the 1947 Institute on Hospital Pharmacy in Chicago by Donald A. Clarke (11), at one time chairman of the Committee on Minimum Standards of the American Society of Hospital Pharmacists. His general outline (12) was the nucleus in the development of the Minimum Standard for Pharmacy Internship in Hospitals (13).

A pharmacy internship in a hospital is a postgraduate program of organized training approved by the Division of Hospital Pharmacy of the American Pharmaceutical Association and the American Society of Hospital Pharmacists. It consists of not less than 2000 clock hours, as indicated above, and extends over a period of not less than a year. The internship schedule includes supervised instruction in the following specific activities:

Outpatient dispensing	250 clock hours
Inpatient and general dispensing	320
Bulk compounding and preparation of sterile products	320
Bulk compounding and prepackaging of non-sterile products	320
Pharmacy administration	480
Collateral and interdepartmental special activities	185
Lectures and conferences	125
Total	2000 clock hours

Each of the above specific activities has been outlined to a considerable extent to serve as a guide in the educational program. Also presented in the Minimum Standard are sections on qualifications of the training hospital, qualifications of pharmacy service, and qualifications of the applicant.

A number of hospitals offer a non-academic internship (8). Because of geographical location of the hospital it is perhaps not feasible for it to associate with a school of pharmacy in an educational program. However, it is possible for a student to satisfy the internship requirement in one of the hospitals offering a non-academic internship and complete the requirements for the master's degree at one of the schools offering the graduate program.

The future of hospital pharmacy education as indicated by answers to the questionnaire is interesting. Of the schools which do not presently have either undergraduate or graduate courses, seven and possibly eight will institute undergraduate courses in hospital pharmacy. The five year curriculum in pharmacy seems to be one factor which will influence the colleges to add hospital pharmacy as an undergraduate elective course. Two and possibly three schools will organize a graduate program and two and possibly three schools will develop both undergraduate and graduate courses in hospital pharmacy. One school offering only graduate work in hospital pharmacy hopes to develop undergraduate courses.

Of the schools offering only undergraduate courses in hospital pharmacy, five schools will expand the undergraduate division, and one and possibly three schools will add a graduate program.

Of the schools now offering both undergraduate and graduate courses, two will expand the undergraduate program, and four will make changes in their graduate programs (one school will add a Ph.D. program). Many of the schools expressed a desire to add more hospitals to the group now cooperating in their undergraduate programs, and some wish to add more academic internships in their expanded graduate program.

As was mentioned previously no attempt was made at this time to examine the curricula of the graduate program. Nomenclature of courses designated as hospital pharmacy might also be a problem of some significance because manufacturing pharmacy or dispensing pharmacy, for example, might be labeled "hospital pharmacy" at some schools, perhaps merely because the courses are taught in the hospital pharmacy.

A sound course of study for the master's degree in hospital pharmacy can certainly be selected from the group usually offered in the graduate school. In addition to the graduate courses in pharmacy, for example, hospital pharmacy, manufacturing pharmacy, cosmetic manufacture and emulsions; courses in pharmaceutical chemistry, pharmacognosy, chemistry, microbiology, anatomy, physi-

TABLE I. SCHOOLS OF PHARMACY OFFERING GRADUATE PROGRAMS IN HOSPITAL PHARMACY AND HOSPITALS AFFILIATING WITH ACADEMIC INTERNSHIPS

School of Pharmacy and Hospital	Graduate Courses		Required for Master's Degree				
	Title	Credit(a)	Credit	Thesis	Special Project	Language	Internship No. Hours
CALIFORNIA							
University of California, School of Pharmacy	Hospital Pharm.	3	(b)		Optional		2600
	Hospital Pharm.	3					
University of California Hospital, San Francisco	Parenteral Prods.	2					
	Parenteral Prods.	3					
Veterans' Administration Hospital, Oakland	Manufacturing Pharm.	3					
University of Southern California, School of Pharmacy	Hosp. Pharm.	3	28	Yes	Optional	None	2000
Veterans' Administration Center, L.A.	Hosp. Pharm. Techniques	3					
Bryan Memorial Hospital, Los Angeles							
University of California, L.A. Hospital							
COLORADO							
University of Colorado, School of Pharm. (Hospitals to be selected)	Advanced Hosp. Pharm.	3	24	Yes	Yes	French, German or Russian	1920
	Hosp. Administration	2					
	Hosp. Management & Accounting	3					
	Graduate Seminar & Residency Discussion	1					
CONNECTICUT							
University of Connecticut, College of Pharm. Hartford Hospital, Hartford	Parenteral Preparations (Laboratory)	2 2	24	No	—	None	2000
FLORIDA							
University of Florida, College of Pharm.	Hosp. Pharm.	2	24	Yes	Yes	None	1920
University of Florida Hospital, Gainesville	Hosp. Pharm. Seminar	1					
ILLINOIS							
University of Illinois, College of Pharm.	(c)						
University of Illinois Research and Educational Hospital, Chicago Veterans' Administration Hospital, Hines		—	—	—	—	—	2000
INDIANA							
Butler University, College of Pharmacy	Hosp. Pharm. Admin.	2	30	Yes	Yes	French or German	2000
Veterans' Admin. Hospital, Indianapolis							

TABLE I (CONTINUED)

School of Pharmacy and Hospital	Graduate Courses		Required for Master's Degree				
	Title	Credit(a)	Credit	Thesis	Special Project	Language	Internship No. Hours
Indiana University Medical Center, Indianapolis							
Purdue University, School of Pharmacy	Hosp. Pharm.	2	33	Yes	—	French, German or Russian	None
IOWA							
State University of Iowa, College of Pharmacy	Hosp. Pharm.	3	30	Yes	Yes	None	2000
State University of Iowa Hospitals	Hosp. Pharm.	3					
Veterans' Admin. Hospital, Iowa City							
MARYLAND							
University of Maryland, School of Phcy.	Hosp. Pharm. Admin.	2	30	Yes	No	None	2400
The Johns Hopkins Hospital, Baltimore (d)							
University of Maryland Hospital							
MASSACHUSETTS							
Massachusetts College of Pharmacy	Hosp. Pharm.	2	30	Yes	No	None	2000
Massachusetts General Hospital, Boston	(Laboratory)	8					
Peter Bent Brigham Hospital, Boston							
MICHIGAN							
University of Michigan, College of Pharmacy	Hosp. Pharm. Admin. & Policy	3	28	No	Yes	None	2000
University Hospital, Ann Arbor	Seminar in Hosp. Pharm.	4					
	Preparation of Parenteral Fluids	1					
	(Laboratory)	2					
	Special Problems in Mfg. Pharm.	1					
	(Laboratory)	1					
Wayne University, College of Pharmacy	Parenteral Fluids	3	32	Yes	Yes	None	1980
	Bulk Compounding	4					2000
	Hosp. Pharm. Admin.	2					
	Seminar	1					
	Directed Study	1-3					
MINNESOTA							
University of Minnesota, College of Pharm.	Courses being developed		—	—	—	—	2000
Veterans' Admin. Hospital, Minneapolis							

TABLE I (CONTINUED)

School of Pharmacy and Hospital	Graduate Courses		Required for Master's Degree				
	Title	Credit(a)	Credit	Thesis	Special Project	Language	Internship No. Hours
MISSOURI							
St. Louis College of Pharmacy and Applied Sciences Veterans' Admin. Hospital, St. Louis (e)	General Administration of Hospital	3	32	Yes	Yes	None	600
NEBRASKA							
University of Nebraska, College of Pharmacy	Hosp. Pharm. Admin. Hosp. Pharm. Admin.	2 2	36	Optional	No	None	1920
Lincoln General Hospital, Lincoln	Hosp. Pharm. Admin.	2					
NEW YORK							
Columbia University, College of Pharmacy Hospitals in New York (f)	Hosp. Pharm. Admin.	4	30	Yes	—	None	Available 1920
University of Buffalo, School of Pharmacy	Hosp. Pharm.	3	22	Yes	Yes	French or German	2000
NORTH DAKOTA							
North Dakota Agricultural College, School of Pharmacy	Hosp. Pharm. Dispensing (Laboratory)	2q 1q	45q	Yes	Yes	None	2040
Veterans' Administration Hospital, Fargo	Hosp. Pharm. Admin. Hosp. Pharm. Internship	3q 15q					
OHIO							
Ohio State University, College of Pharmacy	Principles of Hosp. Pharm. Practice	3q	49-54q	Yes	No	None	Available 2000
The Health Center, Ohio State University, Columbus (g)	" "	3q 3q					
PENNSYLVANIA							
Duquesne University, School of Pharmacy (Hospital not listed)	Hosp. Pharm. (Laboratory)	4 2	42	Yes	No	French or German	2080
Philadelphia College of Pharm. & Sciences Jefferson Medical College Hospital, Philadelphia	Hosp. Administration Hosp. Pharm. Admin. Hosp. Pharm. Seminar Hosp. Pharm. Survey	2 2 2 1	26	No	Yes	None	1920
Temple University, School of Pharmacy Temple University Hospital, Philadelphia	Hosp. Pharm. Admin. Hosp. Administration Research in Hosp. Pharm.	6 2 6	30	Yes	Yes	Yes (any modern, pertinent)	2000

TABLE I (CONTINUED)

School of Pharmacy and Hospital	Graduate Courses		Required for Master's Degree				
	Title	Credit(a)	Credit	Thesis	Special Project	Language	Internship No. Hours
University of Pittsburgh, School of Pharm.	Hosp. Pharm.	3	—	—	—	—	2000
Veterans' Admin. Hospital, Pittsburgh	Hosp. Pharm.	3					
TENNESSEE							
University of Tennessee School of Pharm.	Hosp. Pharm.	2q	45q	Yes	—	None	Indefinite
John Gaston Hospital, Memphis	(Laboratory)	1q					
	Hosp. Administration	1q					
	Hosp. Pharm. Mfg.	3q					
TEXAS							
University of Houston, College of Pharm.	Hosp. Pharm.	2	36	Yes	No	None	2000
	Hosp. Pharm.	2					
Veterans' Admin. Hospital, Houston	Hosp. Admin. Organization and Supervision	6					
	Hosp. Accounting	3					
	(Laboratory)	3					
	Parenteral Solutions	2					
	(Laboratory)	6					
University of Texas, College of Pharmacy	Advanced Manufacturing Pharm.	6	30	Yes	No	None	1920
University of Texas Student Health Center, Austin	Formulation of New Pharm. Products	3					
	Seminar in Pharm.	2					
	Research in Pharm.	3					
VIRGINIA							
Medical College of Virginia, School of Pharmacy	Hosp. Pharm. Admin	(h)	(h)	Yes	Yes	French or German	1920
Hospital Division of the Medical College of Virginia, Richmond							
WASHINGTON							
University of Washington, College of Pharmacy	Hosp. Pharm.	2q	45q	Yes	Yes	French, German or Russian	2000
Veterans' Admin. Hospital, Seattle	(Laboratory)	1-3q					

(a) All credits on semester basis unless otherwise specified—"q"= quarter credit.
(b) The degree Doctor of Pharmacy is conferred.
(c) Course is in manufacturing pharmacy for Master's degree.
(d) Reference 14.
(e) Reference 15.
(f) Reference 16.
(g) Reference 17.
(h) Credit awarded in terms of contact hours.

ology, pharmacology, biochemistry, public health, and business might be added. Whatever his specific interests, the candidate for a graduate degree in hospital pharmacy has many good courses from which to select in order to give him a well-rounded education, and this coupled with an internship or residency in hospital pharmacy gives him one of the best educational opportunities possible.

It is in order to comment about the number of pharmacists required to staff the hospital pharmacies during the next ten years. It has been conservatively estimated (18) that in 1970 more than 470 additional pharmacists will be needed annually to fill positions in hospital pharmacies. It appears (18) that somewhat more than 10 per cent of the pharmacy graduates are now and will be entering hospital pharmacy.

Hospital pharmacy education at the undergraduate level can help to meet the manpower shortages in this specialization by supplying staff pharmacists and by promoting student interest in hospital pharmacy. The five year program allows time for hospital pharmacy electives. Graduate programs in schools of pharmacy are being expanded to meet the demands for training chief pharmacists and directors of pharmaceutical services. The need for a much greater expansion, however, is felt in the number of internships. A considerably greater number of both non-academic and academic internships will have to be provided by our hospitals and we will have to see that these internships are filled by qualified candidates.

REFERENCES

(1) Spease, Edward, *J.A.Ph.A.*, 21, 1216 (1932).
(2) Sonnedecker, Glenn, *Am. J. Hosp. Pharm.*, 15, 507 (1958).
(3) Spease, Edward, *Bull. Am. Soc. Hosp. Pharm.*, 10, 362 (1953).
(4) *Ibid.*, *J.A.Ph.A.*, 25, 65 (1936).
(5) *Ibid.*, *Hospitals*, 10, 73 (1936).
(6) Parker, Paul, *Am. J. Hosp. Pharm.*, 15, 308 (1958).
(7) Green, Melvin W., *Bull. Am. Soc. Hosp. Pharm.*, 12, 227 (1955).
(8) Plein, Elmer M., *The Modern Hospital*, 93, 108 (1959).
(9) "Report: Committee on Hospital Pharmacy Education," *Am. J. Hosp. Pharm.*, 15, 232 (1958).
(10) Flack, Herbert, *Bull. Am. Soc. Hosp. Pharm.*, 12, 261 (1955).
(11) Clarke, Donald A., *ibid.*, 4, 97 (1947).
(12) "Report of Committee on Minimum Standards," *ibid.*, 5, 239 (1948).
(13) "Revised Minimum Standard for Pharmacy Internship in Hospitals," *Am. J. Hosp. Pharm.*, 15, 228 (1958).
(14) "News," *Bull. Am. Soc. Hosp. Pharm.*, 14, 220 (1957).
(15) "News," *Am. J. Hosp. Pharm.*, 16, 85 (1959).
(16) *Ibid.*, p. 38.
(17) *Ibid.*, p. 132.
(18) Archambault, George F., *ibid.*, 15, 131 (1958).

THE GRADUATE HOSPITAL PHARMACY PROGRAM AT NORTH DAKOTA AGRICULTURAL COLLEGE

MURIEL C. VINCENT

In view of the fact that hospital pharmacy is a rapidly expanding facet of the profession, many schools of pharmacy are including courses in hospital pharmacy in their curricula at both the undergraduate and graduate levels. This emphasis is well deserved, as the pharmacist in a hospital is playing an increasingly prominent role as a specialist in the field of medications. More and more does he have the responsibility of the purchase, storage, and distribution of these medicinals and of being a source of information about all aspects of these drugs.

The graduate program in hospital pharmacy at North Dakota Agricultural College has been in operation since July 1, 1957. The program consists of a two year period of study—one year devoted to course work and one year devoted to a residency in one or several of the accredited hospitals in North Dakota. The satisfactory completion of the graduate work leads to the degree of master of science in pharmacy with a major in hospital pharmacy. A certificate of residency in hospital pharmacy is also awarded.

During the academic year the course work offered includes material on product formulations, dermatologicals, adjusted solutions, isotope techniques, hospital pharmacy, hospital pharmacy administration, toxicology, advanced pharmacology, allergens, crystallography, manufacturing, chromatography, and aerosols. Related work in the fields of economics, personnel management, accounting, and bacteriology is also available. The selection of courses for each student will vary somewhat depending upon the student's academic background. Research and thesis requirements are begun at this time also; however, they are usually not completed until the end of the residency year.

The North Dakota hospitals presently associated with the North Dakota Agricultural College in this program are St. John's Hospital, St. Luke's Hospital and the Veterans Administration Hospital, all of Fargo, and St. Alexius Hospital in Bismarck. The Fargo hospitals have cooperated with the College from the start of the program, while the Bismarck hospital joined the program last July.

A student living in Fargo for his residency year will spend four months in each of the three hospitals. The student in Bismarck spends a full year at the hospital there. In either case the residency constitutes a total of 2040 hours. During this year the student receives a stipend from each of the hospitals, an amount totaling $2862. Each student is required to be a registered pharmacist before entering the residency phase of the program.

In the hospitals the resident is given instruction and experience by the hospital staffs in outpatient prescriptions, general dispensing, manufacturing, administration, and other duties which are required of hospital pharmacists. He is adequately informed about the function and correlation of the different departments in the hospitals and spends varying amounts of time in each of them. He also attends various hospital committee meetings and conferences, aids in the instruction of student and practical nurses, edits a pharmacy bulletin, revises the hospital formulary, and completes in each hospital an assigned problem dealing with some particular phase of hospital pharmacy.

A complete record of the resident's experience is maintained in a notebook.

This notebook not only contains an itemized account of situations and problems that will be met in hospital practice but also includes an outline of the entire program and the various duties and instructions, given on a week by week basis, for each hospital. Different phases of the residency that are carried out specifically by one of the hospitals are noted in the appropriate places.

As the three Fargo hospitals feel they do not have quite sufficiently broad programs and ancillary departments to carry out the entire residency requirements alone, the utilization of a rotating residency has been particularly satisfactory. One outstanding merit is that the student benefits from the contact with both private and government hospitals gaining new ideas and viewpoints and learning the problems and situations that are peculiar to each type. Each of the hospitals involved emphasizes the phase of hospital pharmacy that is particularly well developed in that hospital, such as administrative procedures, dispensing, purchasing, manufacturing, etc. Each, however, does not exclude other phases of the student's instruction in order to carry out this emphasis.

In regard to the association we have with the Veterans Administration Hospital it should be pointed out that our residency program differs from others operated by the Veterans Administration. The usual Veterans Administration residency program consists of a twenty-two month period of training with the student concurrently working half time (not more than twenty-eight hours per week) in a Veterans Administration hospital only and attending classes at the college of pharmacy the remainder of the time.

Another program just initiated (July 1959) by the Veterans Administration is one concerning pharmacy internship. Here pharmacy graduates of recognized schools receive specialized training in hospital pharmacy for a one year period. At the same time the individual gains experience which may be applied for state board licensure. The School of Pharmacy at North Dakota Agricultural College will offer this type of hospital pharmacy program beginning July, 1960 in addition to our regular program.

We believe this graduate program in hospital pharmacy at North Dakota Agricultural College has worked out very well. To date six persons have completed the two year course of study, and nine more are at various stages of their graduate work. The success of this curriculum would not be possible without the able support and excellent cooperation of our area hospitals. We have been extremely fortunate in that all the hospital pharmacists and administrators involved are enthusiastic supporters of the program.

With the expanding field of hospital pharmacy, not only in pharmacy as such, but also in the related fields of administration, personnel, purchasing, laboratory techniques, etc., it is important that pharmacy should provide qualified persons either to perform these duties or to supervise them. This is particularly true in our area where smaller hospitals do exist—some of them without pharmacists in charge of medicinal preparations. It is here that an adequately trained person can be of great benefit to a hospital, not only because he can take care of all the needs of the pharmacy but also because he can assume the responsibilities and duties of other phases of hospital operation. As we well know, smaller hospitals are many times not financially able to hire two people at full-time salaries for half-time jobs, whereas a satisfactory salary is possible for one person performing both jobs.

What better way can we ensure the continuing service of pharmacists throughout the entire hospital than through adequately designed instruction which our schools of pharmacy can ably perform if they choose.

REPORT OF THE COMMITTEE ON CURRICULUM, 1959

A meeting of the Committee on Curriculum was held at Duquesne University on March 13 and 14, 1959. In attendance were Dean Heber W. Youngken, Jr., Dr. Martin Barr, Dr. Joseph R. Burckhalter, and the Chairman. Dr. Floyd A. Grolle and Dr. William M. Heller were unable to attend.

The agenda for the meeting was predicated on a previous recommendation of the Committee concerning a survey of the impending five year program as well as a suggestion from the Executive Committee concerning such a survey. Under Item 30 of the Minutes of the November, 1958 meeting of the Executive Committee, entitled "Survey of Progress of the Five Year Program," the following action was recommended: "A discussion of the impending inauguration of extended programs of education for pharmacists indicated a need for some additional information on the plans of member colleges. Much helpful thinking has been done by faculties in making out their curriculums. Unless an effort is made to collect and publish the essence of this planning, it will be unavailable to other faculties. It was suggested that the Committee on Curriculum collect the facts and prepare a report on curriculums now in operation and contemplated, which require more than four years after high school to complete. Particular attention should be given to the reasoning behind the selection of courses, particularly those in the fields of general education and liberal arts, as well as in the scientific and professional areas."

In view of the scope and importance of the survey, the Committee on Curriculum prepared a comprehensive questionnaire based on the information deemed necessary and valuable in planning and implementing the extended program. Objectives, content, sequence, and results in the case of colleges already on the program were the basis of the questionnaire. Completed questionnaires were received from fifty-six member colleges. The resumé of the questionnaire results presented in this report, however, refers only to five year programs. The data were collated and presented without comment or interpretation at the 1959 meeting of the Association. It was the consensus of the Committee that the objective of the survey was to collect the facts for subsequent study and interpretation by faculties and administrators rather than to offer opinions or suggestions on planning and implementing the extended program.

Due to the length of the Report of the Committee on Curriculum presented at the 1959 meeting and the prohibitive cost of its publication in this journal, the Executive Committee requested that the chairman prepare a resumé of the more obvious and important features of the data. It is suggested, nevertheless, that the raw data will be of greater interest and value in curriculum studies. A limited number of additional copies of the original report are available on request from the office of the Secretary-Treasurer in mimeographed form.

The following comments are based on the more obvious aspects of the initial report and represent what may be considered to be the essence of the questionnaire results:

1. The average number of academic units (credit hours) in general education (humanities and social sciences) is twenty-nine; in basic sciences and mathematics, fifty-eight; in professional courses, seventy-eight. The average number of *elective* academic units is sixteen with and without restrictions as to the number required in general education, basic sciences and mathematics, or profes-

sional courses. Ninety-two *new required courses* will be offered in the five year program which were not offered in the four year program. An average of fifteen academic units of such courses has been incorporated into the extended program. Total number of academic units added to the former four year program is approximately thirty-one, one-half of which are elective courses. An average of 165 academic units is required for a degree in pharmacy. Elective courses in general education, basic sciences, and mathematics will be offered in each year of the five year sequence. There are fewer elective courses in the third year of the five year sequence than in other years. Professional electives occur principally in the fourth and fifth years. In addition to the expected increase in elective courses in general education, there appears to be a marked increase in the number of professional elective courses which will be available.

2. Comparison of four and five year programs indicates an increase of 5 per cent in general education, a decrease of 1 per cent in basic sciences and mathematics, and a decrease of 4 per cent in professional courses. Fifty-five courses were dropped in the planning of the five year program. A large number of courses were modified or incorporated into other courses with no significant gain or loss of academic units. Forty-eight required courses in the four year program were expanded in the five year program representing an average increase of two academic units per course.

3. All colleges anticipate and will accept students with advanced standing from prepharmacy programs in other institutions; there will be some restrictions on elective courses acceptable in the case of transfer students. A majority of colleges have based their sequence in chemistry on the inclusion of qualitative analysis in general chemistry. A large percentage of colleges with a preprofessional requirement of two years will accept organic chemistry courses from other institutions; a small but significant percentage have relegated organic chemistry to the first professional year in the two-three program.

4. Approximately one-half of the member colleges will offer courses in their undergraduate sequence which are acceptable for graduate credit. Of the above number, approximately one-half of the courses will be recognized for both undergraduate and graduate credit.

5. Concentrations (majors, options) will be offered in approximately one-half of the colleges. Retail, hospital, and industrial pharmacy are the most popular specializations. Other concentrations include preparation for graduate study as well as concentrations in the five generally accepted areas of the curriculum. In most cases, the basis for the various specializations is the proper selection of elective courses.

6. Other than courses in organic chemistry, quantitative analysis, and biochemistry, most courses in basic sciences and mathematics are taught by nonpharmacy faculty.

7. Of forty-nine colleges reporting, sixteen indicated that the five year program does not provide adequate time to achieve the stated objectives of the Pharmaceutical Survey. Only three colleges reported that the extended program would not provide a higher level of professional instruction or a better integration of professional courses.

8. Of fifty-one colleges reporting, forty-three will confer the Bachelor of Science in Pharmacy, five will confer the Bachelor of Science, and three will confer the Bachelor of Pharmacy degree.

9. Among colleges presently on the five year program, seven report an increase and seven report a decrease in enrollment.

It is generally agreed that the proposed curricula will undergo a number of modifications in the next several years. Reports on progress of the extended program would be most valuable, and it is recommended therefore that the Committee on Curriculum undertake the responsibility for reporting significant developments in objectives, content, sequence, and results.

John G. Adams, Chairman

I ask therefore that you look upon general education not as a mere frill or an extra embellishment but rather as a support of sound professional training, as a mainstay in the lives of those who render professional services to society, as a means whereby democracy gains strength to deal with its problems in the modern age.

Lloyd E. Blauch, Am. J. Pharm. Ed., 13, 454 (1949)

REPORT OF THE DELEGATE TO THE AAAS

The One Hundred Twenty-Sixth Meeting of the American Association for the Advancement of Science was held in Chicago, Illinois, December 26, through December 31, 1959.

It is impossible in this type of report to refer more than briefly to the wide range of significant presentations given at such a meeting. Such talks as "How Did Life Begin," by Sidney W. Fox (Professor of Chemistry and Director, Oceanographic Institute, Florida State University); and "Genes, Viruses, and Cancer," by Wendell M. Stanley (Professor of Biochemistry and Virology and Director, Virus Laboratory, University of California), were very worthwhile.

Over 300 persons registered as having attended one or more of the eight sessions of the Pharmacy Section (Np). The program of the Section was arranged by Glenn L. Jenkins, Vice-President and Chairman (Purdue University); John E. Christian, Secretary (Purdue University); George F. Archambault (U.S. Public Health Service); and Joseph A. Oddis (American Hospital Association); and was co-sponsored by the American Pharmaceutical Association, Scientific Section; American Association of Colleges of Pharmacy; American Society of Hospital Pharmacists; American College of Apothecaries; and the National Association of Boards of Pharmacy.

The following papers were presented in the Sessions for Contributed Papers, presided over by Dean George L. Webster and Dr. John Autian:

"The Assembly and Operating Characteristics of an Improved 4 Pi Liquid Scintillation Counter" (Billy G. Dunavant, John E. Christian).

"The Quenching of Fluorescence in Liquid Scintillation Counting of Labeled Organic Compounds" (C. T. Peng).

"The Application of Neutron Activation Analyses to the Microanalyses of Gold Containing Pharmaceuticals in Biological Materials" (James P. Vacik, John E. Christian).

"Tetrahydroquinolizinium Salts I: Method of Synthesis of 2-Hydroxy-3-Bromoquinolizinium Bromide" (K. M. Wischmann, A. V. Logan, D. M. Stuart).

"The Color-coding of Solid Drug Dosage Forms by Means of C.I.E. Trichromatic Coefficients" (Robert G. Brown).

"Hydration of Procaine Base" (W. A. Strickland, Jr.).

"Method for Evaluating Availablity of Aspirin from Enteric Coated Tablets" (Joseph V. Swintosky, Rudolph H. Blythe).

"The Physical-Chemical Basis of the Buffered Aspirin Controversy" (Gerhard Levy, Barbara A. Hayes).

"Evaluation of Suppository Bases" (Joachim Anschel).

"The Solubilization of Riboflavin by Complex-Formation with Caffeine, Theophylline, and Dimethyluracil" (David E. Guttman, Monohar Y. Athalye).

"The Interactions of Xanthine Molecules with Serum Albumin I: The Binding of Caffeine by Bovine Serum Albumin" (M. L. Eichmann, D. E. Guttman, E. P. Guth).

"Binding of Drugs by Plastics III: The Effect of pH and Solvents on the Interaction of Sorbic Acid with Nylon" (Z. I. Shaikh, A. J. Kapadia, J. Autian).

"The Isolation and Characterization of a New Amino Acid: β-Amino-λ-Phenylpropionic Acid" (Egil Ramstad, Allan M. Goodeve).

"The Origin of Tropic Acid Moity of Hyoscyamine" (Allan M. Goodeve, Egil Ramstad).

"Effects of Meprobamate and Perphenazine on Human Visual Motor Learning, Manifest Anxiety, and Values" (John O. Meany).

"The Social Psychology of Prescription Writing" (Esther J. W. Hall, Norman G. Hawkins).

"Phenylalanine, A Precursor of Berberine" (Jack L. Beal, Egil Ramstad).

"Incorporation of Mevalonic Acid into Digitoxigenin" (Egil Ramstad, Jack L. Beal).

"Application of Paper Chromatography and Electrophoresis to the Assay of Pharmaceutical Products" (Herbert Schriftman, Robert C. Schultz).

"Study of the Fate of Tumor Implant on Rats Using Cells Labeled with Sulfanilic-S^{35} Acid" (C. T. Peng).

"A Comparative Study of Analgesimetric Methods" (Albert I. Edlin, Arthur Tye, John W. Nelson).

"Effects of Physostigmine on the Egg Day Survival of Chloramphenicol Treated Embryonated Chick Eggs" (Vernon A. Green).

"The Distribution of C^{14} Meprobamate in Rat Brain" (John L. Emmerson, Tom S. Miya, George K. W. Yim).

"A Pharmacological Prevention of Acute Heart Failure from Neuromuscular Stress in Rats Conditioned for Cardiac Necroses" (John W. Ingalls, Jr.; Samuel L. Friedman).

"The Metabolism of Glycolic Acid-1-C^{14} in Rat Liver" (F. D. O'Connell, Egil Ramstad).

"Presence of a β-Glucoside (Lonicerin) in Honeysuckle and Its Spontaneous Conversion to an Acid" (M. R. Shastri, Egil Ramstad).

"The Effect of Freeze-drying on Constituents of *Podophyllum* Root" (Mahenc Shah, Earl P. Guth).

"The Law of Initial Value in Pharmacology" (Joseph Wilder).

"The Theory of Relativity and Arterial Failure" (Harry Lobel).

"Biological Effects of Magnetic Fields I: General" (M. F. Barnothy, J. M. Barnothy).

"Biological Effects of Magnetic Fields II: Treatment of Cancers and Radiation Syndrome" (J. M. Barnothy, M. F. Barnothy).

"Spray-drying of Tablet Granulations I: A Preliminary Report" (A. M. Raff, M. J. Robinson, E. V. Svedres).

The hospital pharmacy group had an informative and well-attended full day session under the guidance of Dr. George F. Archambault and Joseph A. Oddis. The meetings were held in the new building of the American Hospital Association.

The Vice-Presidential address on "Professionalism and the Pharmaceutical Scientist" by Dean Glenn L. Jenkins was followed by the presentation of the following Contributed Papers on Hospital Pharmacy:

"Application of Closed System Techniques in Environments Related to Hospital Services" (Kenneth R. Nelson, Jr.).

"The Solubilization of Iodine with Tween 20" (Edward N. Deeb).

"Administrative Determinations and Policies Relative to the Use of Radioactive Medications and Investigational Drugs in Hospitals" (Milton W. Skolaut, Robert M. Farrier).

"Hospital Association-Hospital Pharmacist Liaison" (David M. Kinzer).

"Solvency of Hospitals—A National Economic Problem" (George M. Scattergood).

"Some Social Forces that Will Affect the Hospital and the Hospital Pharmacy" (Ray E. Brown).

"The Joint Committee of the American Hospital Association and the American Society of Hospital Pharmacists and Its Role in American Hospital Pharmacy" (George F. Archambault).

"Patient-Oriented Hospital Standards: A Realistic Approach to State Regulation" (Oliver J. Neibel, Jr.; Philip A. Austin; Al Bailey).

"The Pharmacist's Role as Drug Consultant in the Hospital" (Donald C. Brodie).

"Hospital Pharmacy Planning" (Paul F. Parker).

"The Pharmacist's Role in Nursing Education" (Eleanor C. Lambertsen).

"Drug Name Integrity" (Wm. E. Woods).

"The Principle of Prior Consent in the Formulary System" (Don E. Francke).

"The Role of the French Military Pharmacist as Debated in the Academy of Medicine in Paris During 1873" (Alex Berman).

"Statistical Findings and Interesting Case Reports of the National Clearinghouse For Poison Control Centers" (Henry L. Verhulst).

A symposium entitled "The Scientist's Part in Protection of the Public, Part I: Food, Drug, Cosmetic and Hazardous Chemical Problems, and Part II: Food Additive Legislation," attracted considerable interest on the part not only of pharmaceutical scientists but also of many individuals from other scientific disciplines. Dr. Joseph V. Swintosky and Dean Glenn L. Jenkins served as presiding officers over the sessions. They included the following papers:

"The Labeling of Hazardous Chemicals: A Help or a Hindrance?" (Bernard E. Conley).

"Pharmaceutical Ingredients Legislation: The Problems and Approaches to Solving Them" (William F. Bousquet).

"The Role of the Cosmetic Scientist in Protecting the Public Health" (Raymond E. Reed).

"The Applications of Radioisotope Tracer Techniques to Studying the Food Additive Problem" (John H. Rust).

"Problems in Evaluating the Safety of Intentional Food Additives" (O. Garth Fitzhugh).

"Problems in Evaluating the Safety of Unintentional Food Additives" (A. J. Lehman).

"Scientific Judgment in Law and Regulations" (Edward J. Matson).

"The Role of the Scientific Expert Under Recent Food Laws" (Bernard L. Oser).

The symposium was terminated with an hour-long question and answer session on current food, drug, and cosmetic problems.

The AAAS Council, the governing body of the Association, elected Dr. Joseph V. Swintosky, Smith Kline & French Laboratories, as Vice-President of the Association and elected Dr. Don E. Francke, University of Michigan, to serve on the Committee-at-Large of the Section for a four-year term. Dr. Swintosky will serve as Chairman of the Section for the coming year and will preside at the New York meeting in December, 1960.

Dwight L. Deardorff, Delegate

EDITORIAL

In theory, the high income of professional people is justified by their extensive training and the vital services these professions provide to society. One could argue the rightness or wrongness of this high income on logical and moral grounds. But the conclusion is the same: a needed item or service which is in short supply produces a seller's market. One must pay the price. The alternative is to find a substitute which is cheaper. The degree of quality of the substitute in many instances in our seller's economy is not critical within limits. But beware of the substitute for the fully qualified (though more expensive) professional man.

Unless something is done soon about the salaries of professors of pharmacy, the whole profession is going to feel the impact of sliding down hill with nothing to stop it because its academic underpinnings are gone or are too weakened by substitution. Universities are not bidding high enough for pharmacy people; retail pharmacy is. Highly competent pharmaceutically trained persons are in short supply; retail pharmacy bids high for their services; universities seem to be unable to stay with the bidding or to be turning to substitutes. The problem is critical.

Those in medicine (must they always lead the way?) have seen the handwriting on the wall. In the United States a medical dean makes about $7,000 more than a pharmacy dean. One medical dean makes $40,000 a year. A dentistry dean makes about $3500 more than a pharmacy dean. A veterinary dean makes about $2500 more than a pharmacy dean. And so we could go on to compare the other academic ranks. Full professors of pharmacy make $2800 less than their medical counterparts, $1500 less than their dental counterparts, and $500 less than those in veterinary medicine. Associate professors of pharmacy make $2400 less than those in medicine, $1100 less than those in dentistry, and $1100 less than those in veterinary medicine. Assistant professors of pharmacy make $1600 less than those in medicine, $600 less than those in dentistry, and $300 less than those in veterinary medicine. These are mean figures (*Higher Education*, 14, 108 (1958)). They tell only part of the story. In ten state-supported schools in 1958, the range of medical salaries for preclinical professors was from $15,800 to $17,500, clinical departments from $17,000 to $25,000. The highest paid professor of a clinical medical department makes $27,000. The highest paid professor of pharmacy makes $19,750. (References: *A Study of Medical College Costs* by A. J. Carrol (1956) and "AACP Confidential Salary Survey" by George L. Webster (1960)).

What do the salary differences prove? Are professors of pharmacy more plentiful than professors in the other health professions and, hence, their market price is lower? The answer is "No." Pharmaceutical educators are in short supply. And the reason they are scarce is the same reason that medical and dental educators are scarce. The professions themselves attract too many potential educators. The question then arises, do the other professions produce larger net incomes than pharmacy produces and, hence, attract more persons from the educator ranks?

Recent figures on the incomes of practicing physicians and veterinarians are (conveniently?) "not available." So let's compare the dentist and the retail

pharmacist. A general dental practitioner has a net income of $13,290; a specialist, $19,640 (oral surgeon $18,623; orthodontist, $23,426, pedodontist, $16,432, and periodontist, $20,106). When a dentist graduates he will earn a net income of about $6,000 a year. By the time a dentist is thirty years old his net income will be $12,527. (Mean figures, American Dental Association 1959 Survey of Dental Practice.)

In a recent survey in the state of Washington (memorandum from Dr. H. Bang) it was shown that a retail pharmacist in Washington with less than a year's experience may be expected to have an income of $6,150, the pharmacist with less than five years' experience, about $7200 but up to $10,500. (Surveys of some other states would show considerably higher figures than these.) These figures do not include managers' or owners' salaries. The late Dean Rufus A. Lyman often said, "If you don't own or manage a store ten years after graduation, you don't need to come to see me; you're a failure!"

A store with a $60,000 to $70,000 gross business and filling about thirty to sixty prescriptions a day will pay the proprietor about $16,000. A store grossing between $100,000 and $125,000 and filling over fifty prescriptions a day will pay the proprietor about $20,500. A store grossing $200,000 to $250,000 and filling over seventy-five prescriptions a day will pay the proprietor $32,900. A store grossing over $300,000 and filling over one hundred prescriptions a day will pay the proprietor $44,000. (Figures from *The Lilly Digest for 1958*, Eli Lilly and Company.) These figures seem to indicate that the practicing pharmacist is better paid than his dental counterpart. This is believed to be also true in comparing a pharmacist to a veterinarian. Basing judgment on the comparison of income in the practice of the professions, pharmacy professors should be paid higher salaries than dental or veterinary professors.

What's the starting salary for beginning assistant professors in pharmacy? Possibly $6500 to $7500 would bracket most starting salaries. This means that after three to five years in graduate school the superior student who has undergone this additional training of graduate school will be in the same income bracket as the dunderhead who scraped through undergraduate training willy-nilly. When both are ready to retire, "willy-nilly" probably will be making several times what the professor is, and he will have been doing so for twenty to thirty years.

The conclusion seems to be that the income of pharmacists compares favorably with the income of the other health professions. It seems, however, that the universities are, in the case of pharmacy, ignoring the problem to the great disadvantage of pharmaceutical education and, hence, to the profession. Whereas, the other health professions have difficulty recruiting potential teachers, the lower comparative salary structure in pharmaceutical education and the higher income of the practicing pharmacist makes the problem even more acute for us.

Unless something is done about the salaries of professors of pharmacy soon, the whole profession is going to feel the impact of sliding down hill with nothing to stop it because its underpinnings are gone or are too weak. You, my colleagues, are the underpinnings of the profession.

Pharmaceutical education has met the problem obtusely or not at all, *obtusely* by encouraging educators to take outside jobs and also by hiring "substitutes" from other areas of education such as chemistry and botany. In other instances the problem has not been met even obtusely, and the morale of pharmaceutical educators has suffered. Needless to say, such actions or such inaction are disturbing to anyone concerned about the future of pharmaceutical education.

In a complex profession in a world of advancing science, professors of pharmacy can't run off to practice retail pharmacy in the summer or on weekends to augment their incomes and still do justice to their teaching. Whatever these outside jobs are, they detract from our main business at hand; they undermine the possibility of maintaining the ideals and profits of research and teaching; they give comfort to the critics who see this outside activity only as extra money which implies that teaching is a leisure occupation. Furthermore, they make the task of securing adequate full-time salaries a great deal more difficult.

Also, in our shortage of pharmacy professors let us not delude ourselves that a substitute professor can do the job. Professors of pharmaceutical subjects cannot be made from professors of chemistry or botany. The latter people can teach the elements of their science, but they can't produce the flavor and the *esprit de corps* of the profession. In recent years the flavor seems to need freshening, and the 5,000 year old *esprit de corps* needs to be aired more frequently. Dr. Varro E. Tyler, Jr., put it very plainly (*Proceedings of the Nineteenth Annual Conference of District No. 7, AACP and NABP, 1959*):

> Unless the administrators of our colleges of pharmacy are acutely aware of this discrepancy in background, there is the distinct possibility that increased salaries will attract still more non-pharmacy personnel to our colleges. Certainly no one would call an electrician to fix a leaky faucet in his home, but some deans of colleges of pharmacy persist in hiring persons with no pharmaceutical training to teach professional courses, particularly those in the area of biological pharmacy. Although this may not have been an extremely serious problem in the past, it may become so in the future because of the longer period of academic preparation required of pharmaceutically educated persons. The importance of this situation must not be minimized, or graduate education in pharmacy, particularly in biological pharmacy, will be sure to suffer. This is the greatest potential danger of the five-year undergraduate curriculum, but it will remain a danger only as long as the administrators of some of our colleges of pharmacy remain improperly oriented toward their profession.

Pharmacy-trained professors must lead the profession of teaching pharmacy, and they must do so with confidence in their financial future. Disgruntled professors do not enourage graduate students to become professors. As idealistic as a young faculty member may be, if he is dogged by the petty cares of sniveling poverty, if his wife has to make-do too often, and if he spends his spare time on do-it-yourself projects making low living a little higher, he will have respect neither for his profession of teaching nor for his profession of pharmacy. Perhaps some can live with the Socratic life of self-denial with ease, but most probably will find American life somewhat more difficult to live in and with than that of Ancient Greece. And being in positions of economic embarrassment, these underpaid professors often feel that idleness is their due, that they aren't paid what they think they are worth, and, hence, they decline in output to being worth less than they are paid.

Few rebuilt botanists or chemists are going to instill professional pride and *esprit de corps* in students when they themselves do not have it or believe in it. Neither will they provide the pharmaceutical educators of the future. There is no real substitute for the professional man teaching in professional education.

A professor, particularly a professor who has been educated in the aura of an ancient profession such as pharmacy, must be able to take his position in society with dignity and self-respect. If his income does not allow this then he cannot instill these qualities into his students. Can we remain a profession without dignity and without the respect of ourselves and society? This dignity and respect must find its roots in the colleges of pharmacy and its nurturance in the professors there.

Melvin R. Gibson

ANNOUNCEMENTS . . . . . .

AACP Executive Secretary. Persons interested in nominating themselves or others for the position of Executive Secretary of the AACP should contact the chairman of the selection committee, Dean John G. Adams, School of Pharmacy, Duquesne University, 901 Vickroy Street, Pittsburgh 19, Pennsylvania, before December 1, 1960.

English-Speaking Union Technical College Teachers Exchange Scheme. The AACP Executive Committee has been apprised of a program of exchange of college teachers between the United Kingdom and the United States.

How the Scheme Will Operate

1. The scheme will be jointly administered by the English-Speaking Unions of the Commonwealth and of the United States.

2. Applications will be invited from members of the staff of technical colleges and other establishments of further education dealing with technical subjects in the United Kingdom, and from members of the faculties of comparable institutions in the United States. Successful applicants will be awarded travel grants to cover all normal expenses.

3. The objects envisaged are twofold:—
   (a) to enable the selected grantees to see what is being done in their own field in the other country.
   (b) to give them an opportunity of acquainting themselves with the traditions and way of life and thought of the other country.

   It is not intended that there should be an exchange of posts or that grant-holders should do any teaching during their visit.

4. For each applicant selected in the United Kingdom there will be a reciprocal grant-holder in the United States, and an overlap of a week is contemplated to allow these opposite numbers to meet either on one side of the Atlantic or on the other.

5. Wherever possible, arrangements will be made for the grant-holders to reside with families rather than in hotels, so that they may lead the ordinary life of the citizens of the country visited. In suitable cases the families would be those of their opposite numbers.

6. Financial arrangements are as follows:—
   (a) Each grant-holder will be allowed up to a maximum of 525 dollars to cover transatlantic travel.
   (b) While in the United States, British grant-holders will receive, as a cost of living allowance, sixteen dollars a day.
   (c) While in the United Kingdom, United States grant-holders will receive a cost of living allowance of 2.10.od. pounds a day.
   (d) Grant-holders will also be allowed a small additional sum to cover internal travel expenses.

7. Each grant will provide for a period of fifty-six days in the United States, or the United Kingdom, exclusive of time taken in transatlantic travel.

8. Matters such as pension rights during the period of absence from normal employment will be dealt with by the appropriate authorities in the United Kingdom and in the United States respectively. The English-Speaking Union cannot reimburse grant-holders for any loss of supplementary earnings incurred during their absence abroad.

9. Application will be open to men and women and should be made on forms which will be available on request to the English-Speaking Union at the address printed below.

10. The English-Speaking Union, with the help of expert advice, will place grant-holders where they are likely to derive the maximum benefit from a visit to the United States or to the United Kingdom.

11. It is proposed to invite applications for the first awards in the Spring of 1960, and successful candidates will be able to make their visits at any time mutually agreeable to opposite numbers between mid-September, 1960, and the end of June, 1961. A similar time schedule would be followed in succeeding years.

Inquiries should be addressed to the National Headquarters, The English-Speaking Union of the United States, 16 East 69th Street, New York 21, New York.

NSF grants. Applications will be accepted through October 10, 1960 by the National Science Foundation for fellowships under the Senior Postdoctoral and Science Faculty Fellowship programs.

Awards will be made in the mathematical, physical, medical, biological, and engineering sciences, including anthropology, psychology (excluding clinical psychology), and interdisciplinary fields which are comprised of overlapping fields among two or more sciences (such as oceanography, meteorology, biochemistry, biophysics, and geochemistry). In addition, selected social sciences are included under the Senior Postdoctoral Fellowship program.

To be eligible for Senior Postdoctoral Fellowships, applicants must be citizens of the United States, possess special aptitude for advanced training, and must have held the doctoral degree for at least five years or have equivalent education and experience. Senior Postdoctoral Fellows will be selected on the basis of ability as evidenced by letters of recommendation and other evidences of scientific attainment. Applicant's qualifications will be evaluated by carefully chosen panels of scientists appointed by the National Academy of Sciences-National Research Council. Selection of approximately seventy-five Fellows will be made by the National Science Foundation.

The Science Faculty Fellowships are directed toward college teachers of science, mathematics, or engineering, who wish to improve their competence as teachers. These fellowships are open to application by any citizen of the United States who holds a baccalaureate degree or its equivalent, has demonstrated ability and special aptitude for science teaching and advanced training, and has taught at the college level as a full-time faculty member for not less than three academic years and intends to continue teaching. Selection will be based on letters of recommendation, academic records, and other appropriate evidences of professional and scientific attainment and competence.

Applicants' qualification will be evaluated by panels of scientists especially competent to make judgments on the demonstrated and potential ability of teachers of science, appointed by the Association of American Colleges. Selection of approximately 300 Fellows will be made by the National Science Foundation.

Annual stipends to a maximum of $12,000—adjusted to match as closely as feasible the salaried income of the recipients as of the time of application—will be awarded under both these programs. Fellows may engage in study and/or research at any appropriate United States or foreign non-profit institution. A limited allowance to aid in defraying the cost of travel for a Fellow and his dependents will also be available.

Application materials may be obtained from the Fellowships Section, Division of Scientific Personnel and Education, National Science Foundation, Washington 25, D.C. Completed materials must be received not later than October 10, 1960. All applicants will be notified by letter on December 12, 1960, as to the disposition of their applications.

You cannot buy your way into the hearts of people. The old family doctor, or his counterparts in pharmacy, dentistry, nursing and allied sciences, never took a course on the bedside manner, nor did he read books on how to make friends and influence people. He lived each day the life of the Good Samaritan because it was just in him to do so.

Robert J. Fischelis, Am. J. Pharm. Ed., 13, 303 (1949)

NEW LITTLE PEOPLE

Andrea Goyan—born May 4, 1960, to Dr. and Mrs. Jere Goyan, University of Michigan.

Lisa Kathryn Tiemann—born to Mr. and Mrs. Kenneth Tiemann, University of Texas.

William John Sheffield, Jr.—born to Dr. and Mrs. W. J. Sheffield, University of Texas.

Robert Michael Gennaro—born February 27, 1960, to Dr. and Mrs. Alfonso R. Gennaro, Philadelphia College of Pharmacy and Science.

Grafton D. Chase, Jr.—born May 12, 1960, to Dr. and Mrs. Grafton D. Chase, Philadelphia College of Pharmacy and Science.

Edward Glenn Rippie—born March 31, 1960, to Dr. and Mrs. Edward G. Rippie, University of Minnesota.

MARRIAGES

Dr. Joseph G. Cannon, Associate Professor of Pharmaceutical Chemistry, University of Wisconsin, to Dr. Carolyn B. Abrahams, Project Associate in Chemistry, University of Wisconsin, July 15, 1960.

STAFF CHANGES . . . . . .

NEW STAFF MEMBERS

University of California. Dr. John C. Craig, University of Sydney Department of Organic Chemistry, has been appointed professor of pharmaceutical chemistry effective July 1, 1960. Mr. Donald L. Sorby has been appointed assistant professor of pharmacy and pharmaceutical chemistry effective September 1, 1960. Mr. Sorby will receive his Ph.D. from the University of Washington this summer. Dr. Manfred E. Wolff, Smith Kline & French Laboratories, has been appointed assistant professor of pharmacy and pharmaceutical chemistry, effective July 1, 1960.

University of Michigan. Dr. Joseph Burckhalter, Professor of Pharmaceutical Chemistry, University of Kansas, has been appointed professor of pharmaceutical chemistry to replace Dr. F. F. Blicke who has retired. Dr. George Milosovich, Associate Research Pharmacist, Parke Davis and Company, has been appointed assistant professor of pharmacy. Dr. Joseph Sinsheimer, Associate Professor of Pharmaceutical Chemistry, University of Rhode Island, has been appointed associate professor of pharmaceutical chemistry.

University of Connecticut. Dr. Marvin H. Malone, Assistant Professor of Pharmacology, University of New Mexico, has been appointed associate professor of pharmacology.

Oregon State College. Dr. Robert F. Doerge, Smith Kline & French Research and Development Section, has been appointed professor of pharmaceutical chemistry effective September 1.

Northeast Louisiana State College. Dr. Edward Platcow, Ferris Institute, has been appointed assistant professor of pharmacology. Dr. August G. Danti, Wayne State University, has been appointed associate professor of pharmacy. Dr. Robert Goettsch, University of Kansas, has been appointed assistant professor of pharmaceutical chemistry. Mr. Nathan Watzman has been appointed assistant professor of pharmacology. Mr. Watzman is completing the requirements for the Ph.D. at the University of Pittsburgh.

Rutgers University. Dr. Thomas Medwick has been appointed assistant professor of pharmaceutical chemistry effective July 1. Dr. Medwick received his Ph.D. from the University of Wisconsin and for the past two years has been a research analyst for Merck and Company.

North Dakota Agricultural College. Dr. James Vacik, Purdue University, has been appointed associate professor of pharmaceutical chemistry. Dr. William Shelver, who recently received his Ph.D. degree from the University of Virginia, has been appointed assistant professor of pharmaceutical chemistry.

New England College of Pharmacy. Mr. John T. Nichol has been appointed associate professor of English and speech. Dr. C. William Nixon has been appointed associate professor of physiology and anatomy. Dr. Kenneth J. Ballard has been appointed associate professor of pharmacy. Dr. F. William Wlassich has been appointed assistant professor of chemistry.

University of Washington. Dr. E. Roy Hammarlund, Associate Professor of Pharmacy, Washington State University, has been appointed associate professor of pharmacy.

Temple University. Dr. Ronald F. Gautieri has been appointed assistant professor of pharmacology. Dr. Gautieri received his Ph.D. from Temple.

Southwestern State College. Mr. John Runikis, formerly a student at the University of Washington, has been appointed assistant professor of pharmacy. Mrs. Tany Brown has been appointed instructor of pharmacy.

University of Maryland. Dr. Nicholas Zenker, who recently received his Ph.D. from the University of California, has been appointed associate professor of pharmaceutical chemistry effective July 1, 1960.

Washington State University. Mr. Theodore Sokoloski, who will receive his Ph.D. from the University of Wisconsin this summer, has been appointed assistant professor of pharmacy. Mr. Keith Guillory, who will receive his Ph.D. from the University of Wisconsin in January, has been appointed assistant professor of pharmacy effective February 1.

Auburn University. Dr. William F. Head, Jr., Eli Lilly and Company, has been appointed associate professor of pharmaceutical chemistry.

Purdue University. Dr. Wayne Kessler, Assistant Professor of Pharmaceutical Chemistry, North Dakota State Agricultural College, has been appointed assistant professor of health physics. Dr. Kessler received his Ph.D. from Purdue in 1959.

Medical College of Virginia. Dr. Anthony Simonelli has been appointed assistant professor of pharmacy. Dr. Simonelli recently received his Ph.D. from the University of Wisconsin.

CHANGES IN STAFF TITLES

University of Wyoming. Mr. William D. Hardigan has been promoted from instructor of pharmacy to assistant professor.

Temple University. Dr. David E. Mann, Jr. has been promoted from associate professor of pharmacology to professor.

University of California. Dr. Eugene C. Jorgensen has been promoted from assistant professor of chemistry and pharmaceutical chemistry to associate professor. Dr. Chin-Tzu Peng has been promoted from assistant professor of chemistry and assistant research radiochemist to associate professor and associate research radiochemist.

University of Connecticut. Dr. Harold M. Beal has been promoted from assistant professor of pharmacy to associate professor.

University of Wisconsin. Dr. Glenn Sonnedecker has been promoted from associate professor of pharmacy (history of pharmacy) to professor. Dr. Joseph G. Cannon has been promoted from assistant professor of pharmaceutical chemistry to associate professor. Dr. Eunice Bonow (University of Wisconsin-Milwaukee) has been promoted from assistant professor of pharmacy to associate professor.

University of Minnesota. Dr. Charles V. Netz has been promoted from professor of pharmaceutical technology to professor of pharmaceutical technology and associate dean.

Rutgers University. Mr. R. George Kedersha has been promoted from associate professor of pharmacy administration to professor. Dr. John Shinkai has been promoted from assistant professor of pharmaceutical chemistry to associate professor. Dr. Nicholas Lordi has been promoted from assistant professor of pharmacy to associate professor.

University of Arizona. Dr. Lincoln Chin has been promoted from assistant professor of pharmacology to associate professor.

University of Colorado. Dr. Himat R. Mehta has been promoted from instructor of pharmacy to assistant professor.

University of Washington. Dr. Louis Fischer has been named associate dean of the college of pharmacy. Dr. Alain Huitric has been promoted from assistant professor of pharmaceutical chemistry to associate professor.

University of Kansas City. Mr. J. Leo McMahon has been promoted from lecturer in pharmacy administration to assistant professor. Dr. William J. Rost has been promoted from associate professor of pharmaceutical chemistry to professor.

Massachusetts College of Pharmacy. Mr. Robert A. Walsh has been promoted from lecturer in professional relations and public health to assistant professor of pharmacy.

GENERAL NEWS

Wilson installed. Dean Stephen Wilson, Wayne State University, was installed June 8, 1960 as President of the Michigan Branch of the American Pharmaceutical Association.

Superstine to Israel. Mr. Edward Superstine, Chief Pharmacist, Metropolitan Hospital, Detroit, and Special Instructor in Pharmacy at Wayne State University, has accepted the position of Director of Pharmacies, Rothschild-Hadassah University Hospitals, Hebrew University, Jerusalem, Israel.

Wellcome Fellowship. The American Foundation for Pharmaceutical Education recently announced receipt of a gift from Burroughs Wellcome & Company (USA) Inc. to establish an annual graduate fellowship memorializing the late Sir Henry S. Wellcome. The 1960-61 Henry S. Wellcome Memorial Fellowship recipient is Jon Richard May, a second year graduate student at Ohio State University.

A.Ph.A. pamphlet. The A.Ph.A. recently announced the publication of *Proprietary Names of Official Drugs,* a forty-eight page pamphlet to provide a handy reference source to identify drugs official in the 1960 revisions of the *USP* and *NF* by their proprietary or other trade names. Every member of the A.Ph.A., will receive by mail a complimentary copy of this new drug lexicon. For others, single copies are available at twenty-five cents per copy. Quantities of from ten to ninety-nine are available at fifteen cents per copy, and quantity purchases for one hundred or more can be obtained at ten cents per copy, postage prepaid.

Buday receives grant. Dr. Paul V. Buday, Assistant Professor of Pharmacology, University of Rhode Island, has recently received a grant of $1250 from the National Heart Institute to do pharmacologic studies on smooth and striated muscle dynamics as influenced by neurohormones and metallic ion complexation.

New journal. The first issue of *Analytical Biochemistry* published by Academic Press, Inc., has been released recently. Volume I will have six issues to be released during 1960. Subscription price per volume is $15.00. Orders may be addressed to Academic Press, Inc., 111 Fifth Avenue, New York 3, New York.

ASP plans for journal. At its annual meeting in Boulder, Colorado in July the American Society of Pharmacognosy took favorable action on a proposal to further investigate the possibility of assuming joint responsibility with the Lloyd Library and Museum of Cincinnati, Ohio for editing and publishing the quarterly journal of biological science, *Lloydia.*

Urdang dies. Dr. George Urdang, who entered the hospital on June 19 with Parkinson's disease, died June 27, 1960. Dr. Urdang was seventy-eight years old. He retired eight years ago as professor of the history of pharmacy, University of Wisconsin. He retired three years ago as Director of the American Institute of the History of Pharmacy. A memorial will be carried in the Fall, 1960 issue of this journal.

ASP nominations. The American Society of Pharmacognosy at its meeting in Boulder, Colorado in July nominated the following for office: For president, Dr. Norman R. Farnsworth, University of Pittsburgh, and Professor Frank J. Pokorny, Columbia University. For Vice President, Dr. Jack L. Beal, Ohio State University, and Dr. Leo A. Sciuchetti, Oregon State College. For three-year terms on the executive committee, Dean Edward P. Claus, Ferris Institute, and Mr. Edson F. Woodward, S. B. Penick and Company. Election will be by mail ballot.

AAAS papers. Persons wishing to present papers to the Pharmacy Section of the AAAS meeting in New York December 29 and 30 should submit titles along with an original and one copy of a short abstract as soon as possible to Dr. John E. Christian, Secretary, Pharmacy Section, AAAS, Purdue University School of Pharmacy, Lafayette, Indiana. The deadline for this material is September 20, 1960. The pharmacy section headquarters and meetings will be in the Roosevelt Hotel. A two-session symposium entitled "The Scientists' Contribution to the Safe Use of Cosmetics" will be held the afternoon and evening of December 29.

Ketcham grant. Dr. Roger C. Ketcham, Assistant Professor of Pharmacy and Pharmaceutical Chemistry, University of California, has been awarded an NIH grant of $13,643 for studies on substituted stilbenes and their epoxides.

Schwarz sabbatical. Dr. T. Werner Schwarz, Associate Professor of Pharmacy and Pharmaceutical Chemistry, University of California, has been granted a sabbatical leave during 1960-61. Dr. Schwarz received a Gustavus A. Pfeiffer Memorial Fellowship from the American Foundation for Pharmaceutical Education for the sabbatical period to conduct studies on drug absorption at the Swiss Institute of Technology in Zurich. While in Europe Dr. Schwarz also will attend international pharmaceutical meetings.

Spanish researcher at California. Dr. Margarita Celma Villares of the Spanish Atomic Energy Commission studied tracer methodology for radioactive elements in animals and the labeling of compounds of biological interest at the University of California from June 6 to August 5. Her work was done under the direction of Dr. Kenneth G. Scott and Dr. Chin-Tzu Peng.

Bergy honored. Professor Gordon A. Bergy, West Virginia University, who retired in June after forty-four years of teaching at the institution, was honored by the alumni of the School of Pharmacy on May 29 when they dedicated their annual dinner to him in honor of his many years of service to the institution.

Deno in Costa Rica. Dr. Richard A. Deno, Professor of Pharmacognosy, University of Michigan, spent July and August in San José, Costa Rica under a federal government appointment as a consultant in pharmaceutical education to the University of Costa Rica.

Michigan research building completed. The new research building for the College of Pharmacy at the University of Michigan was completed in August at a total cost in excess of one million dollars. It will be used entirely for graduate research in product development, pharmacy technology, and pharmacognosy.

Thoms resigns. Dr. Richard K. Thoms, Associate Professor of Pharmacology, University of Connecticut, has resigned his position to become head of the biological sciences for Lloyd Brothers, Cincinnati, Ohio.

McDonnell heads Columbia trustees. Dr. John N. McDonnell has been named chairman of the Board of Trustees of Columbia University College of Pharmacy. Dr. McDonnell has been acting chairman since the retirement of Mr. Leo Roon a year ago. He has been a trustee since 1953. Dr. McDonnell, General Manager, Pharmaceutical Laboratory Division, Schiefilin and Company, has announced that the plans immediately ahead involve a new College of Pharmacy building and pharmacy institute to be built at the Morningside Heights location of the University.

Dunavant to Florida. Dr. B. G. Dunavant has resigned his position at Purdue University to become associate professor of radiation biology at the School of Medicine, University of Florida.

Radiation biology course at Purdue. Twenty high school biology teachers participated in a six-week summer institute in radiation biology at Purdue University this summer. The program was sponsored jointly by the National Science Foundation and the Atomic Energy Commission and was under the direction of Dr. John E. Christian, Head of the Bionucleonics Department.

Elliott dies. Dr. Edward C. Elliott, President Emeritus of Purdue University, died June 8, 1960. A memorial will appear in the Fall, 1960 issue.

North Carolina building dedicated. The new School of Pharmacy building at the University of North Carolina was dedicated April 24 with Dr. W. Paul Briggs as featured speaker. Mr. Roger McDuffie (class of 1915), prominent pharmacist of Greensboro and North Carolina's Pharmacist of the Year, spoke in behalf of the alumni. The dedication addresses were preceded by a luncheon for invited guests and followed by tours of the new facilities. The exercises were attended by 1200 pharmacists and friends of the school.

Smith resigns. Mr. Edward M. Smith, Instructor in Pharmacy Administration, University of North Carolina has resigned to devote full-time to graduate studies.

Bauguess resigns. Mr. Carl T. Bauguess, Director of Pharmacy Extension, University of North Carolina, has resigned to devote full-time to graduate studies.

Oregon State improvements. Oregon State College has developed plans for construction of a new wing to the pharmacy building and for renovation of the existing building.

Wilson before Kefauver committee. Dean Charles O. Wilson, Oregon State College, appeared before the Antitrust and Monopoly Subcommittee of the Senate Committee on the Judiciary on Tuesday May 10 in Washington, D.C. Dean Wilson opened the hearing speaking on "Generic and Brand Name Pharmaceuticals." Dean Wilson's presentation emphasized the need for the amplification of drug names.

Sciuchetti receives grant. Dr. Leo A. Sciuchetti, Oregon State College, has received a grant of $5060 from the National Science Foundation to direct an undergraduate research participation program in pharmacognosy during the summer of 1960. Four pharmacy students received stipends of $600 to register for credit in pharmacognosy research during a ten-week period. Last year a similar grant involved six pharmacy students.

Schultz receives grant. Dr. H. Wayne Schultz, Oregon State College, has received a $8155 grant from the National Institutes of Health for research on analgesic drugs. The two-year project involves the synthesis of compounds closely related structurally to morphine.

Oregon grants. Grants totaling $1715 have been awarded from the Oregon State College Graduate School General Research Funds to Dr. Ben F. Cooper, Dr. Leo A. Sciuchetti, and Professor Herman C. Forslund to conduct specific projects.

Science Fair at Butler. Dean K. L. Kaufman was general chairman of the National Science Fair International which was

held on the Butler University campus May 10-14. Over 50,000 persons attended. This year's National Science Fair represented the greatest collection of teen-age science projects ever assembled in one place. The NSF tours for the visiting young scientists included the College of Pharmacy.

Kaufman heads Torch convention. Dean K. L. Kaufman, Butler University, was the chairman of the annual convention of the International Association of Torch Clubs which was held in Indianapolis May 4-7. Torch International is an interprofessional men's club which proposes to unite professional men in bonds of better understanding of each other's professions.

Butler grant. The College of Pharmacy of Butler University was the recipient of a grant from the National Science Foundation to conduct undergraduate research in the field of pharmaceutical chemistry and pharmacology. Five students were supported by the grant.

AEC grant to Butler. The Atomic Energy Commission has granted the Butler University College of Pharmacy $9600 to establish a course in radioisotope techniques. The course will begin the second semester of 1960-61 for advanced undergraduate and graduate students.

Kaufman recognized. Dean K. L. Kaufman, Butler University, was the recipient of the J. I. Holcomb Award at the commencement exercises June 12. The award is given annually to the faculty member who has made the greatest contribution to the progress and welfare of Butler University during the year.

Kupchan travels. Dr. S. Morris Kupchan, Associate Professor of Pharmaceutical Chemistry, University of Wisconsin, has received a travel grant from the National Science Foundation enabling him to present a paper at the International Symposium on the Chemistry of Natural Products in Melbourne, Australia in August. The Symposium is sponsored by the International Union of Pure and Applied Chemistry.

Kupchan writes. Dr. S. Morris Kupchan, University of Wisconsin, has prepared eleven articles on alkaloids and other natural products for the forthcoming McGraw-Hill *Encyclopedia of Science and Technology*. Dr. Kupchan was chosen by the Encyclopedia staff to join its team of over 2,000 specialist engineers and scientists who in the past two years have prepared 7,200 separate articles covering the entire field of science and technology. The resulting work will be published this fall in fifteen volumes.

Bonow on committee. Dr. Eunice R. Bonow, Associate Professor of Pharmacy, University of Wisconsin-Milwaukee, serves in 1960 on the National Committee to Encourage Women to Enter Science of Sigma Delta Epsilon, graduate women's scientific fraternity.

Martin elected. Dr. Frank Martin, Northeast Louisiana State College, has been elected vice president of the Louisiana State Pharmaceutical Association for 1960.

Montana installs Rho Chi. Beta Rho Chapter of Rho Chi Society was installed at Montana State University June 2 with Dean Allen I. White of Washington State University as the installing officer.

Sturmer lecturer. Dr. Herald R. Cox, Director of Viral and Rickettsial Research at Lederle Laboratories, was the Julius W. Sturmer Memorial Lecturer at Philadelphia College of Pharmacy and Science April 28. The lecture is sponsored by the Rho Chi chapter.

Laboratory dedicated. The C. Mahlon Kline Pharmacology Laboratory at the Philadelphia College of Pharmacy and Science was dedicated May 10. The laboratory adjoins the main building of the College and was built at a cost of approximately a quarter of a million dollars. It is named in honor of Dr. C. Mahlon Kline, Honorary Chairman of the Board of Smith Kline & French and Vice President of the College.

Griffith selected. Dr. Ivor Griffith, President of the Philadelphia College of Pharmacy and Science, has been selected as the 1960 recipient of the Remington Honor Medal. The recipient is chosen by the past-presidents of A.Ph.A. for contributions made to American pharmacy the previous year or over a period of years.

Harrison honored. Dr. Joseph W. E. Harrison, Director Emeritus of the LaWall Memorial Laboratory of Pharmacology and Professor Emeritus of Pharmacology of Philadelphia College of Pharmacy and Science, was the recipient of the Annual Alumni Award at the spring reunion dinner of the Alumni Association of the College. Dr. Harrison was cited for his pioneering work in the teaching and the practice of pharmacology.

PCP honorary degrees. Philadelphia College of Pharmacy and Science awarded honorary degrees of Doctor of Science to Charles Watson Bliven, Dean of the School of Pharmacy, George Washington University; Robert Wood Johnson, Chairman of the Board of Johnson and Johnson; and Harry C. Kelly, Assistant Director of the National Science Foundation.

Hager appointed. Dean George P. Hager, University of Minnesota, has received appointments to the following committees: Chairman, Committee on Codification, Ciphering, and Punched-card Techniques, Division of Chemistry and Chemical Technology, National Academy of Sciences, National Research Council; Medicinal Chemistry Study Section, Division of Research Grants, National Institutes of Health, U.S. Public Health Service; and Advisory Board, Anti-Radiation Drug Program, Walter Reed Army Institute of Research.

Rutgers fellowships. Two graduate students at Rutgers University are being supported for three years at $2500 a year each from funds granted by the Schering Corporation Foundation and the Merck Company Foundation.

North Dakota grant. A grant of $15,470 from the National Institutes of Health Research Facilities has been made available to the North Dakota Agricultural College School of Pharmacy. The grant will be used to procure specialized research equipment for the new pharmacy building which will be ready for occupancy in September.

Arkansas course. A successful Cosmetics School was held at the University of Arkansas on May 11. Approximately eighty-five drugstores were represented with 116 registering for the course. It was sponsored by the School of Pharmacy, the Little Rock branch of McKesson and Robbins, and their Coty representatives.

Strickland to Upjohn. Dr. William A. Strickland, Jr., University of Arkansas, left on June 1 to work with the Upjohn Laboratories until August.

Arkansas personnel status change. Dr. William M. Heller, Miss Louise Pope, and Mr. James Hamilton are no longer members of the staff of the School of Pharmacy at the University of Arkansas. Dr. Heller is Chief Pharmacist in the University Hospital, Miss Pope is Assistant Chief Pharmacist, and Mr. Hamilton is in charge of Central Supply.

Cole receives grant. Dr. Jack Cole, University of Arizona, has been awarded a U.S. Public Health Service grant of $20,286 over a three-year period for the phytochemical investigation of medicinal plants of the Southwest and Mexico.

Keagle and King honored. Dr. LeRoy C. Keagle, President and Dean of New England College of Pharmacy, and Dr. Rudolph King, Director of Development of the College, have been made honorary members of Alpha Zeta Omega Fraternity.

New England honorary degrees. New England College of Pharmacy awarded honorary Doctor of Science degrees upon Lee Hastings Bristol, Chairman of the Board, Bristol-Myers Company; Dr. Albert L. Chapman, Assistant Surgeon General and Chief, Division of Special Health Services, U.S. Public Health Service; George A. Michael, Director of the Division of Food and Drugs and Deputy Commissioner of the Massachusetts Department of Public Health; and Leavitt C. Parsons, Publisher of *The Apothecary* and *Mid-Atlantic Apothecary* journals.

Poe honored. Dr. Charles F. Poe, Dean Emeritus, University of Colorado School of Pharmacy, was honored at the School of Pharmacy commencement exercises and received the Distinguished Service Award in "recognition of loyalty, devotion, and unsurpassed service to the profession of pharmacy in the state of Colorado."

Sewell installed. Miss Winifred Sewell, Senior Librarian, Squibb Institute for Medical Research, was installed as the 1960-61 president of the Special Libraries Association at its annual business meeting held June 7, 1960 at the Sheraton-Cleveland Hotel, Cleveland, Ohio.

de Neergaard honored. Mr. William de Neergaard, Vice President of the Board of Trustees of Brooklyn College of Pharmacy and a distinguished practicing pharmacist, was awarded the Doctor of Humane Letters degree at the June 10 commencement of Long Island University.

Lunsford Richardson Pharmacy Awards. The 1960 Lunsford Richardson Pharmacy Awards program which has just been completed brings prizes and honoraria aggregating nearly $10,000 to pharmacy students, their colleges, and A.Ph.A. student branch organizations. The program is sponsored jointly by Vick Chemical Company, The Wm. S. Merrell Company, National Drug Company, and Walker Laboratories, Inc. and is designed to encourage original contributions from students of pharmacy, both graduate and undergraduate, to the advancement of the profession. The student winning first prize in each region and the college in which he is enrolled each receive $500 cash awards and a certificate. The student meriting honorable mention receives a $100 cash award and a certificate. In the graduate competition the following won first prizes: Harold L. Smith, Medical College of Virginia; Pushkar N. Kaul, University of California; James P. Leyda, Ohio State University; Norbert Gruenfeld, University of Wisconsin. Also in the graduate division the following won honorable mention: Christopher R. Tamorria, University of Maryland; Chien Li Huang, University of Maryland; Berton E. Ballard, University of California; David A. Hirscher, University of Southern California; Donald J. Lamb, Ohio State University; Patrick P. DeLuca, Temple University; Adriano Alfonso, University of Wisconsin; and Donald T. Witiak, University of Wisconsin. Winning first prizes in the undergraduate competition were the following: Mary H. Hudson, University of Mississippi; Fredrick R. Woods, University of Texas; Norman E. Luber, Philadelphia College of Pharmacy and Science; Emilie C. Blume, State University of Iowa. Winning honorable mention in the undergraduate competition were Robert L. Hood, University of North Carolina; Charles F. Watts, University of Tennessee; Jesse G. Smith, University of New Mexico; William B. Mead, Oregon State College; Kenneth R. Keating, Fordham University; Leslie M. Weinstock, Brooklyn College of Pharmacy; Susan Torrico, Purdue University; and John P. Winkelmann, St. Louis College of Pharmacy and Allied Science.

Washington grants. At the University of Washington Dr. Elmer M. Plein has been granted $3,080 from University research funds for basic research on topical dermatological medications. Dr. Alain Huitric has received a grant of $10,000 from the National Heart Institute for investigation of the chemistry and stereochemistry of possible cardioplegic agents. Dr. L. Wait Rising has had renewed his grant from Western Drug Supply to support manpower studies in the state of Washington.

O'Malley receives grant. Dr. William J. O'Malley, Assistant Professor of Pharmacy, Medical College of Virginia, has received a supplemental grant from the Eli Lilly Research Laboratories to continue his study of the application of electroconductivity to pharmaceutical systems.

Florida fellow. Dr. Danuta Malejka of the Medical Academy of Poznan, Poland is now a postdoctoral fellow in pharmaceutical chemistry at the University of Florida in cancer research.

Liu at Michigan. Dr. Frank T. Y. Liu, Assistant Professor of Physiology, Temple University, was selected to attend the College Teacher Training Program in Radio-Bionucleonics at the University of Michigan from June 22 to August 12, 1960. This is held under the auspices of the National Science Foundation and the Atomic Energy Commission.

Kostenbauder grant. Dr. Harry Kostenbauder, Assistant Professor of Pharmacy, Temple University, has received a grant of $36,900 from the National Institute of Arthritis and Metabolic Diseases for a research project "Physical Chemical Studies on Mechanism of Drug Binding."

Elkin contract. Dr. Samuel Elkin, Assistant Professor of Chemistry, Temple University, has received the reserve commission of lieutenant commander with the United States Public Health Service. A contractural arrangement has been made between Temple University and the Army Chemical Center, Procurement Agency, to support studies by Dr. Elkin and his assistants on methods for preparing chemical intermediates of significance. This contract will provide approximately $12,000 for the support of organic chemical research.

Blockstein at institute. Dr. William L. Blockstein, Assistant to the Dean, Wayne State University College of Pharmacy, was one of sixty persons selected to be a member of the 1960 Institute on College and University Administration at the University of Michigan June 20 to 24. The Institute studies some of the basic problems of college and university administration.

SK & F grants to medical students. A $180,000 grant from Smith Kline & French Laboratories to the Association of American Medical Colleges will support American medical student fellows as goodwill ambassadors in areas of the world where medicine is often practiced in primitive surroundings. During the three years of the planned program about ninety selected medical students who have completed three years of medical school will receive financial grants to permit them to spend vacation periods studying in underdeveloped areas of their choice. This year twenty-eight fellows will receive individual grants ranging from $900 to $3,000.

Doorenbos receives grant. Dr. Norman J. Doorenbos, Associate Professor of Pharmaceutical Chemistry, University of Maryland, has been awarded a $52,000 research grant in support of a steroid research program. Seven graduate students and four postdoctoral fellows are participating in the investigations.

New journal. The *Texas Journal of Pharmacy* under the Managing Editorship of Dean Henry M. Burlage of the University of Texas has joined the ranks of pharmaceutical publications. Volume 1, Number 1 contains editorials, a dean's column, news of faculty research, accounts of original investigations, alumni news, summaries of presentations at the Hospital Pharmacy Seminar, and a student section. The quarterly journal may be ordered from the University of Texas College of Pharmacy. The subscription price is $2.00 a year domestic, $2.50 foreign. Single issues are $0.50 domestic and $0.60 foreign.

Toledo receives grant. The University of Toledo College of Pharmacy has received a grant of $6913 from the Atomic Energy Commission for the purchase of radioisotope detection and related equipment. The equipment will be used to equip a laboratory to be used in a course in radioisotope tracer techniques.

SK & F gifts. The Smith Kline & French Foundation gave $735,611 to more than two hundred organizations throughout the nation for charitable, scientific, and educational purposes during 1959 it was disclosed in a report released by trustees of the Foundation. The 1959 disbursements, largest year total ever given by the Foundation, brought to $3,433,738 the amount awarded by the independent trust since it was established by Smith Kline & French Laboratories in December, 1952.

AIBS translations. The American Institute of Biological Sciences is currently translating and publishing seven Russian research journals in biology. These journals are translated with support from the National Science Foundation, which is eager that such information be more widely distributed to biologists throughout the world. It is hoped that this material will aid biologists in research, prevent duplication work, give some idea of the work being done by Soviet scientists in the field of biology, and also bring about a better international understanding among scientists.

Because of the support of the National

Science Foundation, the AIBS can offer these translations at a fraction of their publication cost, with even further price reduction to AIBS members and to academic and non-profit libraries. This reduction, the AIBS feels, places the translation within the reach of all biologists.

The journals currently being translated are: Doklady: Biological Sciences Section; Doklady: Botanical Sciences Section; Doklady: Biochemistry Section; Plant Physiology; Microbiology; Soviet Soil Science; and Entomological Review.

In addition to its program of Russian Biological journal translations, the AIBS has instituted a separate program of translation and publication of selected Russian Monographs in biology.

It was felt that the program of journal translations was not sufficient to cover all of the significant work being done in all fields of biology by Russian scientists. With the aid of competent authorities, the AIBS has translated and published six Russian monographs and one monograph is in the process of being published. In addition, several prominent monographs in various biological areas are being considered by the AIBS and the National Science Foundation for translation and publication. The monographs that have been published are: *Origins of Angiospermous Plants* by A. L. Takhrajan; *Problems in the Classification of Antagonists of Actinomycetes* by G. F. Gauze; *Marine Biology, Trudi Institute of Oceanology, Vol. XX*, edited by B. N. Nikitin; *Arachnoidea* by A. A. Zakhvartkin; and *Arachnida* by B. I. Pomerantzev. The manuscript for *Plants and X-rays* by L. P. Breslavets is in the final stages of preparation and should be published early in 1960.

Additional information pertaining to this program may be obtained by writing to the American Institute of Biological Sciences, 2000 P. Street, N. W., Washington 6, D.C., U.S.A.

Wisconsin preceptor training. The first of a series of Wisconsin Pharmacy Preceptor Training Conferences (Institutes) attracted over 140 pharmacists of the state of Wisconsin who attended and received instructions on how to teach their trainees.

One of the provisions of the new program for the training of future pharmacists is that the pharmacist desiring to be a preceptor attend a Preceptor Training Conference at least once every two years in addition to attending the annual meeting of a professional pharmaceutical organization and a seminar on pharmacy during the three-year period prior to the date of application for certification as a Preceptor in Pharmacy. The pharmacist must also have been practicing in Wisconsin for thirty-six months, be engaged on a full-time basis in a pharmacy in which no less than 6000 prescriptions are filled annually and which is operated in a professional manner and, the pharmacist must be a member of the Wisconsin Pharmaceutical Association or the Wisconsin Society of Hospital Pharmacists to be certified as a Preceptor in Pharmacy.

Those attending the Conference, which was sponsored by the Wisconsin Board of Pharmacy in cooperation with the Extension Services in Pharmacy, University of Wisconsin, first heard Howard E. Wakefield, Associate Professor of Education, University of Wisconsin Extension Division and School of Education, speak on "The Preceptor-Intern Relationship." Dr. Robert C. Parkin, Associate Director, Medical Training Programs, Veterans Administration, discussed the "The Preceptor-Intern Relationship in the Medical Profession."

Luncheon speaker, Paul A. Pumpian, Secretary of the Wisconsin Board of Pharmacy spoke on "The Need for an Effective Internship Program" and pointed out not only the need for such a program but also the reasons for the requirements for certification as a Preceptor in Pharmacy and for the various phases of the Trainee's program.

Following the luncheon a panel discussion was held for each of the groups of retail pharmacists and hospital pharmacists attending the conference. Panel members for each audience were members selected from their respective fields of endeavor and discussed "Instruction in the Operation and Management of the Pharmacy," "Instruction in the Operation and Management of the Prescription Department" and "Instruction in Legal and Moral Professional Responsibility."

In scheduling future conferences, the Board intends to provide at least one conference annually and to rotate the site of the conference so that the pharmacists in the various sections of the state will have an opportunity to attend and participate.

Primary responsibility for growth and progress and improvement in the practice of pharmacy rests upon the colleges—the members of this Association.
Bernard V. Christensen, Am. J. Pharm. Ed., 13, 443 (1949)

BOOK REVIEWS

The Biosynthesis and Secretion of Adrenocortical Steroids Biochemical Society Symposia, No. 18, F. Clark and J. K. Grant, Editors. Cambridge University Press, New York, New York, 1960. vi + iii, 96 pp., illus. $5.00.

This book consists of seven papers presented by British scientists at the Biochemical Society Symposium held at Senate House, the University of London in 1959. The contents are as follows: (1) "The Separation, Identification, and Determination of Adrenocortical Steroids," by I. E. Bush, (2) "The Biosynthesis of the Adrenocortical Steroids," by J. K. Grant, (3) "The Morphology of the Adrenal Cortex," by T. Symington, (4) "The Relation of Steroid Secretion to the Histologic Zones of the Adrenal Cortex," by P. J. Ayres, (5) "The Secretion of Sex Hormones by the Adrenal Gland," by R. V. Short, (6) "The Control of the Secretion of Corticosteroids," by M. Vogt, and (7) "Mechanisms of Corticotrophin Action." Within the scope of the above papers most aspects of the biochemistry of the adrenal cortex are embraced. All of the authors have made significant personal experimental contributions to the problem.

Grant discusses the reactions involved in the biosynthesis of adrenal cortical steroids as well as the enzymes and reaction mechanisms involved therein. Bush points out that this work would not have been possible without improved methods of identification and determination. The latter author discusses in considerable detail the techniques utilizing partition chromatography. The more recently developed and more sensitive methods utilizing isotopically labelled reagents are not discussed.

The morphology and cytology of the adrenal cortex as well as the relation of steroid secretion to the histologic zones of the adrenal cortex have been quickly reviewed by Symington and Ayres. The relationship of the pituitary gland in the control of the glucocorticoid, mineralocorticoid, and androgen secretions of the adrenal cortex discussed by Vogt and Saba embraces the most important recent advances in the literature. It is gratifying to note that species differences in anatomy and function are stressed.

In view of the important role of the adrenal cortex in the stress phenomenon it would be desirable that future symposia on the adrenal cortex problem place greater emphasis on the growing literature in this field.

The authors have pointed out those aspects of the adrenal cortex problem in which major experimental gaps remain. This volume should thus stimulate interest in young scientists who might wish to accept the challenge of the unknown, the unsolved.

Michael M. Clay
Columbia University

The Thyroid Hormones, Volume 1, R. Pitt-Rivers, and J. R. Tata (with a chapter on Diseases of the Thyroid by W. R. Trotter). Pergamon Press Inc., New York, New York, 1958. xiii + 247 pp., 22 figs., 10 tbls. $7.50.

This volume is the most recent addition and the first book to appear under the Division of Biochemistry in the popular series of International Monographs on Pure and Applied Biology.

In the words of the authors: ". . . the present work is intended to unfold the story of the thyroid hormones and to discover which hypotheses concerning the biosynthesis, mode of action and etiology of thyroid disorders, have received experimental support." The authors succeed admirably in fulfilling their objectives, for, actually, the result of their efforts is a concise, well-written, and authoritative summation of our present knowledge of the physiology and biochemistry of the thyroid hormones. The book also attempts to make available in a convenient form the pertinent literature as an aid and guide to investigators in this field.

The subject matter is divided into nine chapters based on an extensive bibliography of 1774 references. Topics are dealt with in the following order: historical development, chemistry of thyroxine, iodinated compounds of the thyroid, biosynthesis, transport mechanisms, physiological actions, concepts of mode of action, extrathyroidal distribution and metabolism of iodine, biochemical pathways, diseases of the thyroid, and an appendix on methods of assay and physical properties.

The chronological organization of each section is especially useful in that (in certain areas) it allows a contrast between the lack in earlier works and the more recent well-documented reports. Worthy of special mention is the chapter on diseases of the thyroid, which, brief though it may be, provides an effective orientation of the over-all aspects of the basic problems to be solved in this area.

The section covering assay methods in the appendix is intended more as a guide than a detailed account of procedures for practical applications. Only brief mention is made of

the general principles involved with some attempt at critical evaluation. For full discussion in each case a comprehensive list of references is provided as an aid to workers in this field.

Finally, from a perusal of this volume one is clearly convinced that in spite of the enormous amount of work that has been done in connection with the thyroid and its active principles many questions remain to be answered. We do not know by what mechanisms the thyroid concentrates iodine. We know practically nothing about the enzymes involved in thyroid hormone biosynthesis, and the physical chemistry of thyroid hormones has received little attention. Lastly, although the over-all effects of thyroid hormones on the whole animal are well recognized, the mode of action of these has still to be discovered.

In general, this book should serve as an indispensable guide and reference to endocrinologists and research workers in the field of thyroid physiology. It should be of special interest to physiologists, biochemists, and clinicians. It definitely merits inclusion in pharmacy and medical libraries.

Ross J. Marano
Fordham University

Methods in Medical Research, Volume 8, H. D. Bruner, Editor-in-Chief. Year Book Publishers, Chicago, Illinois, 1960. xiv + 368 pp., illus. $9.75.

In the editor's preface to the third volume of *Methods in Medical Research,* R. W. Gerard noted that, "The great Ludwig wrote 'Die Methode ist alles,' and surely the advancement of science attests the overwhelming importance of methodology." In light of this statement it seems paradoxical that so few publications are basically concerned with an organized approach to the fundamental problems of biomedical technology. This series, which fills a tremendous need for the periodic reevaluation of data-gathering processes, increases in value with the appearance of each new volume as a widening field is gradually covered.

Volume 8 is divided into three principal, self-contained sections, each representing a major area of medical research. Specific chapters within each section are authored by outstanding investigators who have detailed "the nuts and bolts of the procedures which they know to be productive."

I. "Life History of the Erythrocyte." In this section there are outlined modern technics for the examination and culture of bone marrow, and quantitative chemical and radiochemical methods for the estimation of red blood cell formation, cell-volume, and life-span. These are clear presentations of the principles involved and the limitations of methods for the study of red cell dynamics.

II. "Measurement of Responses of Involuntary Muscle." This section presents a critical appraisal of classic and newer approaches to the measurement of the responses of smooth muscles of various origins. The contributors have skillfully summarized the current state of the art. Although selected topics pertaining to this vast and important technological area have been discussed in detail, the value of the review is enhanced markedly by extensive references to marginal research methods.

III. "Peripheral Blood Flow Measurement." The final section of Volume 8 is devoted to advances and improvements in the methodology of blood flow measurement which have evolved during the twelve years since the rather encyclopedic presentation of such technics in the first volume of this series. Newer technics involving radioactive isotopes and electromechanical devices for the estimation of blood flow are carefully outlined.

Inasmuch as the development and improvement of methods is a matter of continuing effort and concern, researchers should have a vital interest in the expansion of means of effectively communicating such advances. *Methods in Medical Research,* a pioneer which continues to provide outstanding coverage in this area, merits a place in every biomedical scientist's library.

G. Victor Rossi
Philadelphia College of Pharmacy and Science

Diagnostic Biochemistry, Halvor N. Christensen. First Edition. Oxford University Press, Inc., New York 16, New York, 1959. ix + 291 pp., 48 figs., 2 tbls. $6.50.

Students and teachers of clinical biochemistry will be grateful for this excellent text. It is intended to bridge that gap which often exists between the freshman medical course in biochemistry and the application of biochemical data to clinical problems. The subject matter is described by the author as the quantitative distribution of body constituents and their physiological interpretation. In each of the nineteen chapters, emphasis is placed on the dynamic factors which interact to produce at any particular moment the composition of tissue or fluid observed by the analyst. The text is very readable and is accompanied by well-chosen figures and diagrams. Illustrative problems are drawn from current medical literature and considerable freshness and originality are evident throughout the book.

About half of the discussion is devoted to the distribution of ions in the body with considerable attention being given to acid-base balance. Single chapters are also devoted to lipids, circulating carbohydrate, proteins and small nitrogen compounds, steroid hormone transport and substances concerned with the synthesis and catabolism of heme. The final chapter is titled "Getting Useful Chemical Results" and deals with practical

matters of selection of samples and their handling as well as the philosophy of ordering laboratory examinations.

At the end of each chapter library problems are posed. Most of these refer to original articles in the *New England Journal of Medicine* and consist of questions regarding interpretation of data, validity of conclusions drawn by authors, flaws in methodology or logic, and in general are designed to encourage critical thinking. Most of these problems extend and enrich the material covered in the chapters.

The appendix consists of a bibliography and of a group of 338 objective questions concerned with interpretation of clinical biochemical data. The questions are excellent and serve not only as a check on mastery of material covered, but also as models which might be useful to teachers in formulating similar examination material. Answers are provided.

This text is recommended as a complementary text to introductory biochemistry courses that venture into diagnostic areas. Teachers of clinical pathology and other faculty who have the responsibility of guiding students in the wise use of laboratory facilities will find both the factual material and habits of thinking advocated most useful to their students. Clinicians who wish to review this field will find it helpful as will candidates for many specialty board examinations.

In the spectrum of books ranging from the purely biochemical to the purely clinical, this one is written by a chemist for clinicians. Clinical chemists will appreciate the teaching value of the work and will recognize its usefulness in the training of clinical pathology residents and of advanced medical technology students.

Nelson F. Young
Medical College of Virginia

Clinical Application of Antibiotics, Volume IV. Erythromycin and Other Antibiotics, M. E. Florey. Oxford University Press, New York, New York, 1960. viii + 303 pp., 15 figs., 13 tbls. $19.50.

The author, an eminent clinical scientist in the field of antibiosis, has compiled in this, the final volume in the series, a remarkable and comprehensive survey of the literature on twenty-seven antibiotics many of which were not mentioned in preceding volumes. Bacitracin, carbomycin, erythromycin, neomycin and polymyxin are considered in a detailed fashion while more brief accounts are given of twenty-two other antimicrobial agents of lesser clinical importance.

The fourth volume reflects the enormous progress that has taken place in the short span of three years since the appearance of Volume III. This monograph summarizes and co-ordinates the considerable clinical and preclinical knowledge available on certain antibiotics. The text which is set up in excellent physical form is divided into nine parts comprising a total of seven clearly written chapters, a bibliography with more than 1200 balanced references, and an index at the end of the book.

In Chapters 1 and 2 we find a detailed discussion of erythromycin and antibiotics related to erythromycin by reason of bacterial cross resistance. The first five drugs mentioned are not only discussed from the standpoint of mode and duration of action but also in connection with those pharmacological aspects that are related to drug therapy, especially in infectious diseases. The net result is that full perspective on therapy is considered. The principal secondary drugs are clearly outlined according to the above pattern. The next two chapters fully describe those antibiotics inhibiting both gram-positive and gram-negative bacteria. The writer's presentation of those antibiotics which control the staphylococcus is excellent in that it provides several guidelines and clinical impressions for proper therapy.

In Chapter 5 Dr. Florey considers those antibiotics of limited clinical application owing to some toxic effect without considering extensively their pharmacological and toxicological actions. Antibiotics active against protozoa, fungi or neoplastic cells are considered in Chapter 6. The author has wisely chosen to limit the scope of this section by considering the actions of antibiotics primarily in man.

As in the previous volumes, there appear numerous significant subheadings; for example, on page 101, five such headings are included. An outstanding feature of Volume IV appears in the reporting of data; the author has found it convenient to include more than fifty significant charts in addition to figures and tables.

Perhaps the greatest single contribution of the series is found in the eighty-seven pages of Chapter 7 dealing with the differential choice of antibiotics in clinical medicine. Dr. Florey's vast clinical experience with antibiotics, flavored with considerable research, provides a very fragrant background for reviewing the microbiological and pharmacological properties of antibiotics as drugs of choice in clinical practice. The author treats thoroughly this subject under three headings: general consideration; the choice of an antibiotic in diseases due to specific organisms; and the choice of an antibiotic in diseases considered by systems. This last chapter considers all antibiotics of clinical usefulness, including a review of those previously reported in earlier volumes. Much more clinical information relating to absorption, excretion and bacteriological testing has been added and the monographer has done an outstanding job of analyzing and correlating numerous ex-

perimental studies in the light of recent advances in providing a "way of thinking about drugs."

Laboratories and schools of dentistry, pharmacy, medicine, and nursing will find this book meets the needs of students, teachers, and research workers. Clinicians will find this publication invaluable as a comprehensive yet precise coverage of research literature for review and reference purposes. All who read this manual of therapy will find it up-to-date and authoritatively written. Dr. Florey deserves to be congratulated upon the completion of this work.

Edward J. Eugere
Texas Southern University

Biological Organisation, C. H. Waddington, Editor. First Edition. Pergamon Press, Inc., New York, New York, 1959. xviii + 328 pp., 85 figs., 10 tbls. $12.50.

This book covers material at a symposium on biological organization. Dr. Waddington did an excellent job in organizing this symposium. Not only did he organize the subject matter before the meeting by circulating several outlines to the participants, but also at the meeting he acted as a nearly perfect moderator. This book is made up of small informal discussions. The reader finds himself so engrossed in the discussions that he feels he is actually at the symposium. A picture of the participants in the front of the book makes the reader familiar with the speakers who keep adding to this informal discussion. The book is filled with so many ideas on biological problems that all graduate students in the biological sciences, biochemistry, and pharmacology should read it.

The advantage of such a book is that it presents so many unsolved problems to the reader and in such a way as to tie in with what has been already done in a given direction. This book starts with sub-cellular particles and continues to the cellular level. The organizers and inducers of sub-cellular and cellular developments present fascinating reading in terms of what has been done and what is to be done at all levels of development. A minimal amount of chemical formulations was used in the discussions. Perhaps the only disadvantage of this symposium is the lack of absolute facts at this level of discussion that can be carried away from the book, but this is by far outweighed by the challenge of the future research to be done in these fields. The exchange of ideas among workers in the different fields in biology will present a valuable experience to graduate students who read this book. *Biological Organisation* should be used in a graduate seminar course to help orient the graduate student to do independent research.

Leslie E. Edwards
Medical College of Virginia

Neuro-Psychopharmacology: Proceedings of the First International Congress of Neuro-pharmacology, Rome, 1958. P. B. Bradley, P. Deniker, and C. Radouco-Thomas, Editors. Elsevier Publishing Company, Amsterdam, 1959. xv + 727 pp., 174 figs. and 118 tbls. $27.00.

Early in September, 1958, more than 500 biomedical scientists and clinicians met in Rome to hold the First International Congress of Neuro-psychopharmacology. Plans for this meeting were but little more than one year old. Although no plans had been made for publication of the proceedings, on the last day of the congress the decision was made to seek a publisher and issue a report of the meeting. Within about one year most of the manuscripts were collected, edited, compiled, and published.

The makeup of the publication consists of the presentations and discussions from both the symposia and plenary sessions together with 133 individual communications submitted by the participants. The latter occupy the greater portion of the book. The contents include both experimental and clinical reports in psychopharmacology.

The four symposia were concerned with the methods and analyses of drug-induced behavior in both man and animals and the comparison of the abnormal behavioral states produced in both man and animal as well as a comparison in man of the endogenous psychoses with those produced by drugs. Two of the plenary sessions dealt with the effect of these new drugs on psychiatric function and service both in and out of the hospital. The last plenary session was concerned with the present state of neurochemistry. The communications deal both with animal and human experimentation as well as therapeutic reports.

By definition this is the report of the First Internation Congress of the Collegium for Neuro-psychopharmacology, the collegium having been organized the year previously. It is not, however, the first international conference on neuro- and psycho-pharmacology since many of the participants have met many times to report on these same subject matters in the past four to five years. This reviewer was able to select from his bookcase seven other publications having in some instances many papers almost identical to those presented at this first congress. The ease of securing financial support has resulted in an ever increasing number of symposia and conferences, leaving little time for obtaining substantial new research data.

This criticism is not directed so much at the book but more to the events which led to its publication. In such a dynamic field of research and investigation such as this, it is perhaps justified that frequent conferences be held for all to keep pace; however, now that the world has officially had a chance to discuss this problem, future meet-

ings may become less frequent. This problem of increased publication which includes the repeated publication of the same material was a subject of a recent conference of publishers, editors, and librarians in London.

The editors have done a superior job in preparing this book for publication in so short a time. Collection of manuscripts from such a formidable list of participants scattered all over the world is no small feat, but this speed has produced another problem. Critical review and editing of the various manuscripts is lacking; many communications ramble and contain philosophical verbiage that no journal editor would allow.

The usefulness of the book for schools of pharmacy, in fact any school, would be as a reference in the library, since it represents an international summary of the status of neuro-psychopharmacology as of 1958-59. Presumably it will be followed in a number of years by a second and possible subsequent reports of international congresses. Individuals doing research in this area would probably find purchasing this book profitable for it contains numerous references and a bibliography to many more detailed papers and publications. The numerous communications, especially those from investigators in Europe and Asia, make up one of the major good features of this book.

D. C. Kroeger
The University of Texas
Dental Branch

The Principles of Electrophoresis, Rene Audubert and Serge de Mende (translated by A. J. Pomerans). The Macmillan Company, New York 11, New York, 1960. viii + 142 pp., 102 figs., 30 tbls. $7.00.

This is a translation of a book by two French researchers in fields of electrophoresis. Though the original was not available for comparison, the translation appears to have no shortcomings of translation.

The book starts out with a brief chapter on electrolyte conductance. This is followed by a too-brief chapter on conductance properties of colloids. The third chapter summarizes the application of interionic attraction theory to stability and electrokinetic phenomena.

These chapters on the review of basic theory are followed by several on techniques and principles of some of the methods of electrophoretic separation and preparation. A small number of experimental examples are included in each case to give meat to the exposition. Descriptions of both moving-boundary and supported electrophoresis are included. In at least one case the translator took the liberty of revising the text to include British and American work which had been ignored in the original French.

A final chapter discusses sidelights (the use of isotopes for detection) and applications in biochemistry and medicine, with no more than a listing of many important applications.

This little book is a good introduction to the subject of electrophoresis. It is not for the expert, however, as is that of Milan Bier, but it would make excellent background for the latter. It would be most useful to those getting oriented in this as a field of research or those in pharmacy education where understanding of principles short of a definitive treatment would suffice. It would make a fine reference in which students could seek answers to their own questions.

Unless it be the brevity and the lack of detail in the first few chapters, there is not much that merits criticism. The translator has filled in suitable bibliographies where they were lacking in the chapters on basic theory. The authors have supplied adequate references in the later chapters.

L. Dallas Tuck
University of California

A Pharmacologic Approach to the Study of the Mind, Robert M. Featherstone and Alexander Simon, Editors. Charles C. Thomas, Springfield, Illinois, 1959. xxviii + 399 pp. $10.75.

This book contains the papers presented by forty participants in a symposium of the same title held in January, 1959, under the auspices of the University of California School of Medicine and The Langley Porter Neuropsychiatric Institute. The first section of the monograph orients the reader into the general field of psychopharmacology. This is highlighted by the critical review by S. S. Kety of drug action on circulation and energy metabolism, the scholarly contribution by J. Elkes on the need for some points of reference in psychopharmacology, and the critical appraisal by J. O. Cole of the complexities involved in understanding, evaluating, and influencing psychopathologic processes. Unfortunately, the value of other presentations in this section is materially reduced by the lack of references to the relevant literature.

The second portion of the symposium presents a panel discussion on the non-empiric approaches of the basic sciences (psychiatry, psychology, pharmacology, biochemistry, and enzymology) to the subject under discussion. Aside from the objections raised by the participants to a "non-empiric" approach, the papers in this section by E. Callaway III, H. F. Hunt, K. F. Killam, E. Roberts, and E. A. Zeller are fine expositions of conceptualization in basic sciences. Fortunately, these papers also summarize the "empirical" contributions of the authors in their respective fields.

The next part of the book deals with the problems of research design and clinical evaluation. No doubt there are many items in this section of interest to workers in the field. For the most part, however, it does

not go beyond broad generalities, and actually lacks examples which illustrate the many problems encountered in drug evaluation. A similar lack of detail and completeness is apparent in the discussion of tranquilizers which follows.

The monograph is rounded off with a broad coverage of hallucinogens, monoamine oxidase inhibitors, and psychic energizers. The final panel, however, adds some balance and places the psychic energizers in their proper perspective. V. J. Kinross-Wright stresses the wide gaps of factual knowledge in the field and F. H. Meyers emphasizes that drugs can only act on the organic substrate of behavior and not on forces or potencies wholly unconnected with structure or function.

Viewed in its entirety, this monograph constitutes an impressive document of current endeavors in psychopharmacology. If one can overlook the liberal sprinkling of typographical errors, some evidence of inadequate editorial review, and a tendency to revive old terms and coin questionable new ones, it is a worthwhile addition to the literature in this field. Its value would have been enhanced had the editors included an author and subject index.

Ewart A. Swinyard
University of Utah

Bentley and Driver's Textbook of Pharmaceutical Chemistry, Revised by John Edmund Driver. Seventh Edition. Oxford University Press, London, England, 1960. ix + 728 pp., 50 figs. $14.50.

The seventh revision of this textbook follows the release of the *British Pharmacopoeia 1958,* and includes a discussion of those inorganic and organic entities which are official in the *B.P. 1958.* The present edition "has involved the heaviest revision of the book since its original publication." It was the author's intent that the new edition continue to include current developments and advances in knowledge. He also stated that "it is expected that the reading of this textbook will be accompanied by a study of the corresponding parts of the *Pharmacopoeia.*"

Part I (pp. 9-102) of the text is devoted to analytical methods. This section includes a discussion of gravimetric, volumetric and photometric methods, of pH, hydrolysis, acidimetry and alkalimetry, of organometallic complexes, of measurement of radioactivity, and of impurities in *British Pharmacopoeia* substances. This section would not be sufficient for the didactic or laboratory courses taught in U.S. schools of pharmacy.

Part II (pp. 105-242) is devoted to inorganic chemistry. The introduction is devoted to atomic nuclei and radioactivity, and to periodicity and valency. The remaining part of the section is devoted to the inorganic substances arranged according to the groups of the periodic table. Only the official elements or elements of the official compounds appear in this section. In the discussion of these official substances, the information presented follows the "stereotyped order" in the official monograph. The material in Part II is quite limited for teacher-student uses in the U.S. courses in inorganic pharmacy. There is no discussion of important inorganic substances which are not official. A few examples are given to illustrate this point. Only calcium and barium of the alkaline earth metals are included. There is no discussion of strontium or her isotopes. There is no discussion of fluorine or fluorides. The only salts of iron discussed are ferrous sulfate, ferrous gluconate and ferric ammonium citrate. Zirconium and her compounds are not discussed. There is only a short discussion of EDTA. No equilibrium constants are given for the complexing of this chelating agent with cations. Nothing is mentioned of the use of EDTA to chelate metal ions which can cause oxidation of certain organic compounds.

Part III (pp. 245-695) is devoted to organic chemistry. The first part of the section is given to aliphatics, followed by the aromatics. The latter part of the section concludes with the chemistry of the pharmaceutical and/or pharmacological classification of drugs.

Following the discussion of the chemistry of each organic class, there follows a listing and discussion of the official substances belonging to each class. The author does discuss material not entirely related to each organic class when it is necessary. Thus, when the commercial manufacture of ethyl alcohol is discussed, there follows a short dissertation on enzymes. The only chemical aspects of enzymes are included at this point. No mention of enzymes was found on scanning the information under the section on proteins. Ichthammol is discussed under the saturated hydrocarbons, where some other author might discuss this official substance under sulfonic acids.

The reviewer again found definite limitations. In discussing the local anesthetics, sulfonamides, hormones, vitamins, antibiotics, alkaloids, etc., only those official were discussed. The formulas for some but not all of the official organic compounds were given. Thus, many formulas were not included for those alkaloids which are official. A total of seven lines was devoted to reserpine and no structure was given. Since the veratrum alkaloids were not official, nothing was mentioned about them. However, for some of the official substances the discussion was adequate. For example, the reader will find an adequate discussion on chloral and chloral hydrate. The last chapter of Part III is given to alkaloidal assays and other extractive processes.

The appendixes (pp. 699-713) include pharmacopoeial assays, acid-base indicators,

notes on the identification of organic compounds, and atomic weights. The index (pp. 714-728) is adequate.

It is well to keep in mind that the author believes that pharmaceutical chemistry is the chemistry of substances used in medicine. This should be taken literally since the author devotes little or no space for uses and actions of the substances discussed. The reader will become familiar with the chemical aspects of medicinals, but not the medicinal uses. The text is undoubtedly a good supplement to the *British Pharmacopoeia 1958*, particularly with respect to the chemistry, but the text is very limited since non-official compounds are not discussed. Today these non-official compounds are very important. There is no U.S. text in use which this text can be compared with. The text is meant to be a pharmaceutical supplement to the *British Pharmacopoeia 1958* as well as a text for elementary courses in analytical, inorganic, and organic pharmaceutical courses. It is the reviewer's belief that this text would not be adequate for use in U.S. schools of pharmacy. The publisher chose good quality of paper and type. The book is adequately bound.

John A. Biles
University of Southern California

Automatic Titrators, J. P. Phillips. Academic Press, New York, New York, 1959. viii + 225 pp., 59 figs., 8 tbls. $6.00.

Modern automation is having a profound effect on chemical analysis. Routine and repetitive procedures can be done faster and more economically than by conventional manual methods. *Automatic Titrators* surveys the impact of automation on one phase of analytical chemistry, volumetric analysis. The emphasis is on simple or readily obtainable instruments. It is significant that the author states, "only the relatively simple ones ever seem to reach the market."

After a brief introduction, the author considers various aspects of titrator design discussing such topics as instrumental indicators, titration curves, recorders, and controllers. Subsequent chapters deal with specific instrumentation currently in use. Emphasis is on the design, performance, and applicability of the instrument. Classification is based on the end point indication method used. Automatic potentiometric titrators are described first. Amperometric, conductometric, photometric, thermometric, and coulometric titrators are considered in that order. Fully automatic and continuous titrators are examined in some detail. It is indicated that at the present time only potentiometric and photometric end point indicators employ fully automatic and continuous titrators. A brief section is devoted to commercially available titrators. These predominantly used potentiometric end point detection. In the final chapter applications of automatic titration methods are reviewed and many examples are cited from the literature. An appendix is included in which a number of electronic terms are defined but is of questionable value to the analyst. The subject index is incomplete.

The author has done a thorough job in surveying automatic titrators. The presentation is well-organized, concise, and lucid. Each chapter is replete with references. However, since the survey is up-to-date as of September, 1958, and since the field is changing so rapidly, it appears that this book will be outdated in a short time. Nevertheless, it is recommended as a reference source for the analytical chemist and the pharmaceutical chemist with a special interest in instrumental analysis and who is engaged in graduate work, research, or industry. It is of little value to the undergraduate pharmacy student. The price is a little high.

Martin I. Blake
Argonne National Laboratory

Detoxication Mechanisms, R. Tecwyn Williams. Second Edition. John Wiley & Sons, Inc., New York, New York, 1959. x + 796 pp. $19.00.

This book is devoted to a consideration of the mechanisms whereby the body reduces the toxicity of organic compounds other than those normally considered under fat, protein, carbohydrate, vitamin, steroid, and mineral metabolism. There are a total of twenty-one chapters, the initial one of which includes a brief historical outline of existing knowledge relative to detoxication reactions and in which the author emphasizes his view that such reactions are logically divided into four categories, i.e., oxidation, reduction, synthesis, and hydrolysis. It is pointed out that metabolic alteration of organic compounds sometimes yields substances which are more toxic than the parent compound. The reactions responsible for such alteration cannot be considered to be detoxication reactions and are, therefore, not covered in the book.

Chapters 2 through 4 are devoted to the metabolism of aliphatic compounds including hydrocarbons, alcohols, aldehydes, ketones, and acids. Chapters 5 and 6 treat of the metabolism of cyclohexane and its derivatives, and of aliphatic amines, amides, and compounds derived from these nitrogenous bases.

The next seven chapters outline the metabolism of aromatic compounds beginning with hydrocarbons, followed by halogenated hydrocarbons, phenols, alcohols, ethers, carbonyls, acids, nitriles, nitro compounds, and amines. Three chapters are then concerned with the metabolism of dyestuffs, sulfones, sulfonamides, and the terpenes. The heterocyclic compounds are covered in two chapters, one primarily concerned with monocyclic derivatives, and the other with polycyclic compounds.

A chapter devoted to the metabolism of organic compounds of phosphorus and arsenic as well as certain organo-metallic compounds is then included. In the final chapter the author discusses the various hypotheses which have been formulated to explain why the toxicity of metabolites of organic compounds is lower than that of the parent compounds. Here are discussed such phenomena as the "chemical defense hypothesis," "surface tension hypothesis," "biochemically inert compounds," etc.

This reviewer was quite favorably impressed with the author's approach to metabolic detoxication and with the clear and concise manner in which the subject matter is presented. Factors such as species difference and routes of excretion of the organic compounds and their metabolites are well covered. There are numerous references made to experiments in which the uses of isotopically labelled compounds are used to study detoxication. A most comprehensive bibliography is included and the book seems to be quite free of technical errors. This volume would appear to be a reference book which has a definite place in the library of those whose interests lie in pharmacology and related fields.

Harold C. Heim
University of Colorado

Pain, W. Noordenbos. Elsevier Publishing Co., Princeton, New Jersey, 1959. v + 182 pp., 40 figs., 4 tbls. $8.50.

This is a well-written book which should find a place in every medical science library. In the pharmacy schools, the pharmacologist in particular will find this book interesting and informative. This book is not recommended for undergraduate pharmacy students.

It is divided into twenty-one chapters, each having an excellent list of references for further reading. Sample chapter headings include, "Central Pain," "Afferent Conduction in the Cord," "Denervation Experiments," "The Leak," and "Visceral and Referred Pain."

Dr. Noordenbos points out evidence for afferent conduction patterns which refute the generally accepted concepts of the mechanism of pain perception. His concluding remarks on pain which compose the last chapter are indeed thought-provoking.

Since the author is a neurosurgeon the book emphasizes the afferent pathways along which pain sensations are conducted to the central nervous system. He attempts to correlate clinical pain with changes in conduction pattern and does so admirably.

In the reviewer's opinion, the introductory chapters on the description of sensation, terminology, and measurement should be read by all persons interested in pain.

Tom S. Miya
Purdue University

American Hospital Formulary Service, compiled and edited under the direction of the Committee on Pharmacy and Pharmaceuticals of the American Society of Hospital Pharmacists, William M. Heller, Director. Hamilton Press, Hamilton, Illinois, 1959. xix + 1500 pp., 6 figs., 28 tbls. $15.00. Supplements $5.00 per annum after the first year.

This book is a loose-leaf type with a substantial, expansible cover to accommodate supplements as they are supplied. Being a loose-leaf type of book, the pages are not numbered, but are classified as to the section in which they belong by means of judiciously selected pharmacologic-therapeutic classification numerals which can be expanded by decimals if necessary to include drugs of somewhat different therapeutic use or of different chemical composition within a category. There are twenty-five therapeutic classes of drugs, alphabetically arranged from antihistamine drugs through vitamins to unclassified therapeutic agents. Classification numerals range from 4:00 to 92:00, each differing by four from the adjacent numerals except for the insertion of the numerals ten, seventy-eight and eighty-six. Twenty-nine dividers with index tabs are used to delineate the sections of the book. There are a number of blank pages (about 400) occasioned by the fact that no more than one monograph is included on a sheet, and with some monographs no printing is necessary on the reverse side of the page to complete the monograph. This is not considered a disadvantage in the book.

For brevity drugs are listed in the index by active base even though salts and esters may be included in the formulary. The index indicates location of the monograph in the book by the pharmacologic therapeutic numerals as to section and general location within a section and the monograph is specifically located by alphabetical arrangement. Monographs frequently appear in more than one classification because drugs have more than one therapeutic use. A supplementary index is used to list monographs of supplements as they are supplied and a new cumulative supplementary index accompanies each set of supplements. Supplementary index data will be incorporated into a revised general index when it becomes economically logical.

The drug monographs differ in length but an attempt has been made to supply sufficient information in each monograph so it might serve as a guide for the safe use of the drug in the hospital. Each drug is identified by generic name and where applicable with synonyms, trade names, chemical names, and structural formulas. Given also are actions, uses, contraindications, side reactions, toxicities, doses, and the forms or preparations in which the drug is supplied. In some monographs, for example the one on coal tar, are included formulas for the preparation of dosage forms of the drug. The book

originally contained 605 drug monographs listing 1667 preparations. To date five supplements have been distributed, revised pages have replaced some of the originals and seventy new drugs have been added to the list. Each monograph is dated—1959 for those issued initially and the month and year for those issued as supplements.

A general discussion precedes many of the classes of drugs, for example, antihistamine drugs, sulfonamides, antimalarials, and the tetracyclines. This policy could be extended to other groups of drugs such as the autonomic series, the psychotherapeutic drugs, and the sedatives and hypnotics.

In the appendix are found notes and illustrations on prescription writing, conversion tables, Latin terms and abbreviations, and biochemical tables.

The American Hospital Formulary Service can be used in the hospital in three different ways: (1) only the monographs of drugs selected by the pharmacy and therapeutics committee might be included in the binder, (2) all the pages might be included with those drugs stocked in the pharmacy underlined or checked and (3) the entire book might be used as it is, but supplemented by a separate drug list determined by the pharmacy committee. Most value can be derived from the book when all of the monographs available are included in it. In fact, a hospital may use drugs for which monographs are not available. Blank pages are supplied through the Formulary Service and can be used by the hospital to prepare its own monographs.

The committee responsible for the *American Hospital Formulary Service* has produced a very useful book and by supplying revisions and supplements is truly rendering a service to the hospital pharmacist. This service relieves him of the task of writing a formulary, and with this service available there is no reason for a hospital to operate without a formulary if its pharmacy committee wants one.

This book (service) is to be highly recommended to the hospital pharmacist as a formulary and reference, and to others in the pharmaceutical, medical, and nursing professions as a reference book.

Elmer M. Plein
University of Washington

Cholinesterases. A Histochemical Contribution to the Solution of Some Functional Problems, M. A. Gerebtzoff. First Edition. Pergamon Press, Inc., New York 22, New York, 1959. vii + 195 pp., 125 figs., 4 tbls., 7 plates. $8.50.

This work represents Volume 3 of the International Series of Monographs on Pure and Applied Biology, Modern Trends in Physiological Sciences Division. The foundation of this publication is the consummation of six years of collaborative histochemical research done in the Department of Anatomy, Liège University, Belgium.

Printed in large, legible type, on high quality paper, the book is prefaced by a short introduction to the particular histochemical methods employed by the author in his research. The text is divided into three principal sections: Part I, "Humoral Cholinesterases;" Part II, "Tissue Cholinesterases in the Nervous System and Types of Localization at Nerve-endings;" and Part III, "Survey of Tissular Cholinesterases Outside the Nervous System." Part I deals with the hepatic origin of plasma cholinesterase and the role the hematopoietic organs and placenta play in the acetylcholinesterase activity of erythrocytes and blood platelets. Part II provides a cogent morphogenetic and histochemical background for the continued support of the cholinergic theory of nerve impulse conduction in the cerebrospinal axis; a discussion of the occurrence of acetylcholinesterase in the autonomic nervous system is especially informative and timely. The final section includes an excellent introspection of some of the special facets of "true" and "pseudo-cholinesterase" localization in striated muscle, in the circulatory, digestive, respiratory, urogenital, and endocrine systems, and in the organs of special senses.

Essentially a monograph, this volume is more than a description of the ubiquitous repartition of the cholinesterases, in that the author deftly weaves, in a fine literary style (which our American counterparts might well emulate) a coherent resumé of the interrelationships existing between cholinergic innervation and enzyme localization and amalgamates them with brief discussions of known, suspected, or plausible functional capacities of various vertebrate and nonvertebrate tissues. The author does not fail to comment on the limitations of his own laboratory's results nor the findings of other workers.

Typographical errors are minimal, and the numerous photomicrographs are generally good. A number of schematic plates depicting the relative acetylcholinesterase distribution in the central nervous system of the rabbit adds significantly and graphically to the volume's scope; a few minor abbreviation incongruities between the plates proper and the text do not detract from the former's value. The book is thoroughly documented; author and subject indices are appended.

It goes without saying that this publication reflects contemporary European biological investigation, one rich in basic research. A critique of histochemistry in this area of enzymology, this volume will be a gainful reference for the histologist, histochemist, cytologist, biochemist, enzymologist, and pharmacologist, as well as for others in interdisciplinary fields of study who are interested in a correlation of neurohormonal-enzymatic distribution and physiologic implication.

Paul V. Buday
University of Rhode Island

Theoretical Organic Chemistry: Papers Presented to the Kekulé Symposium Organized by the Chemical Society, London, September, 1958, under the Auspices of the Section of Organic Chemistry of the International Union of Pure and Applied Chemistry. Butterworths Scientific Publications, London, England, 1959. (Available in the United States through Academic Press, New York 3, New York.) xvii + 298 pp. $9.50.

The centenary of the publication of August Kekulé's monumental paper "Ueber die Constitution und die Metamorphosen der chemischen Verbindungen und über die chemische Natur des Kohlenstoffs" was celebrated in London in 1958 by a gathering of a truly illustrious group of theoretical organic chemists from all parts of the world. Each of the twenty speakers in this cosmopolitan symposium presented a theoretical organic chemical paper in his own field of endeavor, and it is the collection of these papers which comprises this book. Especially noteworthy contributors were Linus Pauling ("Kekulé and the Chemical Bond"), C. K. Ingold ("Nucleophilic Octahedral Substitution") and C. A. Coulson ("Molecular Geometry and Steric Deformation"). Nineteen of the papers are in English, the remaining one being in German. All of the papers are well prepared and well written, and all are on an extremely high plane of thought. Beyond this statement, it is not within the qualifications of this reviewer to comment on or criticize the content of the presentations. Due to the esoteric nature of the material presented, it would not be realistic to state that this book belongs on every chemist's bookshelf; however, it does belong on the shelf of every pharmacy or chemistry library. Moreover the book merits careful perusal by every research worker in the pharmaceutical sciences for the wealth of theoretical concepts recorded.

Perhaps even more significant and important is the fact that this small book (better than any other similar publication which this reviewer has seen) delineates the philosophy of modern organic chemical thought, and indicates the direction of future research and progress, as seen by today's leaders in organic chemistry.

Joseph G. Cannon
University of Wisconsin

Lipide Chemistry, Donald J. Hanahan. John Wiley and Sons, New York, New York, 1960. ix + 330 pp., 9.6 figs., 9.12 tbls. $10.00.

The objective of this book is to present the biochemistry of lipides and pertinent information on their chemical and physiochemical properties. An attempt has been made to include as much basic information as possible, and the book contains an exhaustively complete list of references. The subject matter is presented under nine major divisions whose titles indicate the book's scope: "Introduction," "Isolation and Purification of Lipides," "Phosphoglycerides," "Phosphoinositides," "Sphingolipides," "Minor Phospholipides," "Simple Lipides," "Association of Lipides with Proteins," and "Some Naturally Occurring Lipoprotein Systems." It also contains sections on chemical synthesis, isolation procedures, and assay techniques, as well as new information on chemical structure and characteristics of the lipides and related compounds.

A critical attitude has been exercised throughout. Where interpretations are tentative or controversial, the reader is so informed. The material is presented in an easy straightforward style. The book is therefore recommended to all chemists who have a need of a comprehensive picture of lipide chemistry as seen by one of the major contributors to that field.

Claude Piantadosi
University of North Carolina

The teaching staffs engage in too much lecturing and too little teaching, contain too few scientists and too many soothsayers, too few scholars and too many sciolists, too few teachers who are modern pharmacists and too many pharmacists who are not modern teachers.

Edward C. Elliott, Am. J. Pharm. Ed., 13, 258 (1949)

NEW BOOKS

Encyclopedia of Medical Syndromes, Robert H. Durham. Paul B. Hoeber, Inc., New York 16, New York, 1960. xiv + 628 pp. $13.50.

Technical Communication, George Harwell. The Macmillan Company, New York 11, New York, 1960. x + 332 pp., figs., tbls. $5.00.

Blakeslee: The Genus Datura, Amos G. Avery, Sophie Satina, and Jacob Rietsema. The Ronald Press, New York 10, New York, 1959. xiii + 289 pp., 67 figs., 34 tbls. $8.75.

Basic Facts of Body Water and Ions, Stewart M. Brooks. Springer Publishing Company, Inc., New York 10, New York, 1960. 159 pp., 18 figs., 11 tbls. $2.75 (paper).

Blood Pressure and Subarctic Climate in the Soviet Union, Bruno Hoffmann. Department of Health, Education, and Welfare, Public Health Service, Bethesda 14, Maryland, 1960. 86 pp., 13 tbls. Free to cooperating libraries (paper).

Antibiotics Annual 1959-1960, Felix Marti-Ibanez. Antibiotica, Inc., New York 22, New York, 1960. xvii + 1033 pp., figs., tbls. $15.00.

Professional Negligence, Thomas G. Roady, Jr., and William R. Andersen. Vanderbilt University Press, Nashville 5, Tennessee, 1960. xi + 332 pp. $10.00.

Physician's Handbook, Marcus A. Krupp, Norman J. Sweet, Ernest Jawetz, and Charles D. Armstrong. Eleventh Edition. Lange Medical Publications, Los Altos, California, 1960. 6 + 547 pp., tbls. $3.50.

Current Medical References, P. J. Sanazaro. Lange Medical Publications, Los Altos, California, 1959. 6 + 535 pp. $3.50.

Isotopic Tracers, G. E. Francis, W. Mulligan, and A. Wormall. Second Edition. Oxford University Press, Inc., New York 16, New York, 1960. xxi + 524 pp., figs., tbls. $8.40.

Data for Biochemical Research, R. M. C. Dawson, Daphne C. Elliott, W. H. Elliott, and K. M. Jones. Oxford University Press, Inc., New York 16, New York, 1960. xiii + 299 pp., tbls. $10.10.

Proceedings of the International Symposium on Microchemistry, D. Wilson. Pergamon Press, New York 22, New York, 1960. xxvi + 583 pp., figs., tbls. $15.00.

Perfumes, Cosmetics and Soaps, Volume One, W. A. Poucher. Sixth Edition Revised. D. Van Nostrand Company, Inc., Princeton, New Jersey, 1959. xvi + 463 pp., 47 figs., tbls. $12.50.

Perfumes, Cosmetics and Soaps, Volume Two, W. A. Poucher. Seventh Edition Revised. D. Van Nostrand Company, Inc., Princeton, New Jersey, 1959. xii + 453 pp., 89 figs., tbls. $12.50.

The Chemistry of Natural Products, Volume IV, The Natural Pigments, K. W. Bentley. Interscience Publishers, Inc., New York 1, New York, 1960. vii + 306 pp. $5.00.

The Enzymes, Volume 2, Paul D. Boyer, Henry Lardy and Karl Myrback. Academic Press, New York 3, New York, 1960. xiii + 479 pp., figs., tbls. $16.00.

Radioisotope Techniques, Ralph T. Overman and Herbert M. Clark. McGraw-Hill Book Company, New York 36, New York, 1960. xiv + 476 pp., figs., tbls. $10.00.

Statistical Handbook of Science Education. National Science Foundation, Washington 25, D.C., 1960. Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., 1960. viii + 94 pp., 55 figs., tbls. $0.55 (paper).

The Story of Chemistry, Georg Lockemann. Philosophical Library, New York 16, New York, 1959. 3 + 277 pp. $4.75.

The Nature of Science, David Greenwood. Philosophical Library, New York 16, New York, 1959. xiii + 95 pp. $3.75.

Staining Procedures Used by the Biological Stain Commission, H. J. Conn, Mary A. Darrow, and Victor M. Emmel. Second Edition. The Williams & Wilkins Company, Baltimore 2, Maryland, 1960. xii + 289 pp. $5.00.

The Pharmaceutical Pocket Book, Council of the Pharmaceutical Society of Great Britain. Seventeenth Edition. The Rittenhouse Bookstore, 1706 Rittenhouse Square, Philadelphia 2, Pennsylvania, 1960. xii + 576 pp., tbls. $4.20 (postage 30 cents).

A Statistical Manual for Chemists, Edward L. Bauer. Academic Press, Inc., New York 3, New York, 1960. x + 156 pp., tbls. $4.75.

Methods of Biochemical Analysis, Volume 8, David Glick. Interscience Publishers, Inc., New York 1, New York, 1960. ix + 400 pp., figs., tbls. $10.00.

Biochemistry of Steroids, Erich Heftmann and Erich Mosettig. Reinhold Publishing Corp., New York 22, New York, 1960. xi + 231 pp., figs. $5.75 college, $6.90 trade.

The Pharmaceutical Sciences, Second Annual Visiting Lecture Series. The University of Texas College of Pharmacy, Austin, Texas, 1959. v + 254 pp., figs., tbls. $3.00.

Microchemical Methods for Blood Analysis, Wendell T. Caraway. Charles C. Thomas, Publisher, Springfield, Illinois, 1960. xi + 109 pp., 4 figs. $5.25.

Enzymes in Health and Disease, David M. Greenberg and Harold A. Harper. Charles C. Thomas, Publisher, Springfield, Illinois, 1960. xvi + 459 pp., figs., tbls. $14.50.

Photography in Medicine, Arthur Smialowski and Donald J. Currie. Charles C. Thomas, Publisher, Springfield, Illinois, 1960. xviii + 330 pp., 281 figs. $14.50.

Documenta Geigy Scientific Tables, Geigy Pharmaceuticals. Fifth Edition (with supplement). S. Karger (Albert J. Phiebig, American Representative, P.O. Box 352, White Plains, New York), 1959. 547 pp., figs., tbls. $13.45 plus postage and exchange $1.00: $14.45.

The Alkaloids, Volume VII, Chemistry and Physiology, R. H. F. Manske. Academic Press Inc., Publishers, New York 3, New York, 1960. xiii + 559 pp. $17.00.

Poisons and T.S.A. Guide, Council of the Pharmaceutical Society of Great Britain. Sixth Edition. The Pharmaceutical Press (through The Rittenhouse Bookstore, Philadelphia, 3, Pennsylvania), 1960. 75 pp. $1.50.

The List Method of Psychotherapy, Elizabeth Sher, *et al.* Philosophical Library, New York 16, New York, 1960. xi + 258 + 1 pp. $7.50.

General Chemistry, Garth L. Lee and Harris O. Van Orden. W. B. Saunders Company, Philadelphia 5, Pennsylvania, 1960. vi + 637 pp., figs., tbls. $7.25.

An Introduction to Veterinary Pharmacology, Frank Alexander. The Williams and Wilkins Company, Baltimore 2, Maryland, 1960. viii + 179 pp., 22 figs. $4.75.

Encyclopedia of Microscopic Stains, Edward Gurr. The Williams & Wilkins Co., Baltimore 2, Maryland, 1960. xii + 498 pp. $18.50.

An Introduction to Pharmacology, J. J. Lewis. The Williams & Wilkins Co., Baltimore 2, Maryland, 1960. xii + 826 pp., 163 figs., 27 tbls. $11.00.

Laboratory Manual for General Chemistry, Garth L. Lee and Harris O. Van Orden. W. B. Saunders Company, Philadelphia 5, Pennsylvania, 1960. 215 pp., figs., tbls. $3.75 (paper).

Quantitative Paper Chromatography of Steroids, D. Abelson and R. V. Brooks. Cambridge University Press, New York 22, 1960. vii + 103 pp., figs., tbls. $6.00.

British National Formulary, 1960. Alternative Edition, The British Medical Association and the Pharmaceutical Society of Great Britain. The Pharmaceutical Press (through The Rittenhouse Bookstore, 1706 Rittenhouse Square, Philadelphia 17, Pennsylvania), 1960. 292 pp. $1.75 (interleaved $2.25).

Cytology and Evolution, E. N. Willmer, Academic Press, Inc., New York 3, New York, 1960. x + 430 pp., figs., tbls. $10.00.

Advances in Applied Microbiology, Volume 2, Wayne W. Umbreit, Academic Press, Inc., New York 3, New York, 1960. xii + 384 pp., figs., tbls. $12.00.

Transport and Accumulation in Biological Systems, E. J. Harris. Second Edition. Academic Press, Inc., New York 3, New York, 1960. xi + 270 pp., figs., tbls. $9.00.

Epilepsy and Related Disorders, William G. Lennox and Margaret A. Lennox. Little, Brown & Company, Boston 6, Massachusetts, 1960. **Volume One,** xxv +574 pp., 157 figs., 13 tbls. **Volume Two,** xx + 594 pp., 46 figs., 9 tbls. $13.50 for the two volumes.

Chem Sources. Second Edition. Directories Publishing Company, New York 22, New York, 1960. 448 + 21 pp. $17.50.

The Clinical Use of Aldosterone Antagonists, Frederic C. Bartter. Charles C. Thomas, Publisher, Springfield, Illinois, 1960. xi + 211 pp., figs., tbls. $5.00.

Recent Progress in Hormone Research, Proceedings of the Laurentian Hormone Conference 1959, Volume 16, Gregory Pincus. Academic Press, Inc., New York 3, New York, 1960. viii + 608 pp., figs., tbls. $14.00.

Tables for Identification of Organic Compounds, Supplement to Handbook of Chemistry and Physics, Charles D. Hodgman, *et al.* Chemical Rubber Publishing Co., Cleveland, Ohio, 1960. vii + 241 pp., tbls. $7.00.

Educators Guide to Free Films, Mary Foley Horkheimer, and John W. Diffor. Twentieth Annual Edition. Educators Progress Service, Randolph, Wisconsin, 1960. xi + 639 pp. $9.00 (paper).

The Evaluation of Drug Toxicity, A. L. Walpole and A. Spinks. Little, Brown and Company, Boston, Massachusetts, 1960. xi + 138 pp., figs., tbls. $5.00.

Recent Advances in Public Health, J. L. Burn. Second Edition. Little, Brown and Company, Boston, Massachusetts, 1959. xi + 370 pp., 54 illus. $10.00.

The Medical Source Book, Fred A. Mettler. Brown and Company, Boston, Massachusetts, 1959. lxviii + 1000 pp., 178 plates. $25.00.

Neuropharmacology, Transactions of the Fifth Conference, May 27, 28 and 29, 1959, Harold A. Abramson. The Josiah Macy, Jr., Foundation, New York 36, New York, 1960. 8 + 251 pp., 55 figs., 18 tbls. $6.00.

The Antibiotic Saga, Henry Welch and Felix Marti-Ibanez. Medical Encyclopedia, Inc., New York 22, New York. 5 + 150 pp. $3.00.

Synthetic Analgesics, Volume 1, Diphenylpropylamines, Paul A. J. Janssen. Pergamon Press, New York 22, New York, 1960. vii + 183 pp., figs., 19 tbls. $7.50.

Polypeptides Which Affect Smooth Muscles and Blood Vessels, Volume 4, M. Schachter. Pergamon Press, New York 22, New York, 1960. xv + 336 pp., figs., tbls. $8.50.

Biochemistry of Lipids, Proceedings of the Fifth International Conference on the Biochemical Problems of Lipids, G. Popjak. Pergamon Press, New York 22, New York, 1960. xi + 228 pp., figs., tbls. $6.50.

Dental Practitioners' Formulary, The British Medical Association. Pharmaceutical Press (through The Rittenhouse Bookstore, Philadelphia 3, Pennsylvania), 1960. 54 pp. $0.50 (paper).

Fats and Oils, An Outline of their Chemistry and Technology, H. G. Kirschenbauer. Second Edition. Reinhold Publishing Corporation, New York 22, New York, 1960. vi + 240 pp., 33 figs., 7 tbls. $7.00.

The Chemistry of Lipids in Health and Disease, H. K. King. Charles C. Thomas, Publisher, Springfield, Illinois, 1960. vii + 104 pp., figs. $3.75.

MISCELLANEOUS

Unpublished Abstracts of Articles on Pharmaceutical Subjects, Series 9. A Selected Listing of Articles on Pharmacy Administration in Twelve Journals, Clark C. Cramer and Esther Jane Wood Hall. College of Pharmacy, The University of Texas, Austin 12, Texas, 1960. 14 pp. $2.00 (paper).

Unpublished Abstracts of Articles on Pharmaceutical Subjects, Series 10, Henry M. Burlage. College of Pharmacy, The University of Texas, Austin 12, Texas, 1960. 1 + 28 + 12 + 25 pp. $2.50 (paper).

Summary of NIH Programs in Aging, 1959. Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., 1960. 16 pp. $0.15 (paper) (Cat. No. FS 2.22: 4/2).

Highlights of Research Progress in General Medical Sciences, 1959. Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., 1960. 23 pp. $0.15 (paper) (Cat. No. FS 2.22/20:959).

Education Directory, 1959-60, Part 4, Education Associations. Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., 1960. 128 pp. $0.50 (paper) (Cat. No. FS 5.25:959-60/pt.4).

Drug and Condiment Plants. Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., 1960. 34 pp., illus. $0.35 (paper) (Cat. No. A 1.77:5/4).

Scientific Manpower, 1959, Papers of the Eighth Conference on Scientific Manpower, National Science Foundation. Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., 1959. v + 38 pp. $0.30 (paper) (NSF:60-34).

College and University Survey, Part 2: Planning for College and University Physical Plant Expansion, 1956-70. Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., 1960. 112 pp. $0.70 (paper) (Cat. No. FS 5.251:51000).

Narcotic Regulations No. 2. Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., 1960. 38 pp. $0.20 (paper) (Cat. No. T 56.6:2/2).

Federal Support of Medical Research. Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., 1960. 133 pp., illus. $0.75 (paper) (Cat. No. Y 4.Ap 6/2:M 46).

Microscopic-Analytical Methods in Food and Drug Control. Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., 1960. 255 pp., illus. $2.00 (paper) (Cat. No. FS 13.103/2:1).

Raising Guinea Pigs. Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., 1960. 8 pp., illus. $0.05 (paper) (Cat. No. A 1.35:466).

Bibliography on Saliva. Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., 1960. 447 pp. $3.00 (paper) (Cat. No. D 210.15: ACR-48).

Review of Literature on Evaporation Suppression. Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., 1960. 53-69 pp. $0.20 (paper) (Cat. No. I 19.16:272-C).

Statistical Handbook of Science Education. Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., 1960. 94 pp. $0.55 (paper) (Cat. No. NS 1.20:Ed 8).

Scientific Research in Great Britain. Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C., 1960. 285 pp. $0.70 (paper) (Cat. No. Y4.At 7/2:G 79).

There are two things that make a great profession. One is academic standards —those standards that have to do with preparation and ability on the part of those that practice the profession; and the other is the standard of conduct, by which the professional man renders his service to the community.

J. Hillis Miller, Am. J. Pharm. Ed., 13, 283 (1949)